AVERETT UNIVERSITY
SINCE 1859

DATA ANALYTICS

THE FUTURE OF HEALTHCARE

WHAT IS **HEALTHCARE DATA ANALYTICS?**

Data analytics is a rapidly evolving field as leaders across all industries recognize the importance of translating a proliferation of data into information that is insightful and actionable.

Healthcare leaders rely on analytics to inform strategies for managing costs, driving quality, improving access to care, and improving patient experiences. As the novel coronavirus (COVID-19) pandemic impacts every aspect of the healthcare sector, robust analytics capabilities are more important than ever. Medical and public health leaders look to data analytics experts for information to predict how the disease will spread, discover new treatment options, and plan for how the pandemic will be managed clinically (Goasduff, 2020).[1] While healthcare leaders are enacting contingency plans to respond to COVID-19 and planning their recovery efforts, the fundamental mission remains the same - provide value and high-quality health care at an affordable cost.

While there are many opportunities to leverage data analytics to advance healthcare priorities, four key priorities include:

- **VALUE-BASED CARE**
- **HEALTHCARE COSTS**
- **POPULATION HEALTH**
- **BIG DATA**

VALUE-BASED CARE

Centers for Medicare and Medicaid Services (CMS) and commercial healthcare insurance payors continue to shift from volume-based to value-based payment models, creating financial incentives for healthcare providers to achieve excellent patient outcomes.These programs are designed with complex mathematical algorithms that determine whether healthcare providers will be rewarded or penalized financially based on their performance relative to that of other healthcare providers. Data analytics can help healthcare providers maximize reimbursements under value-based programs by identifying opportunities for reducing healthcare-acquired conditions and unplanned readmissions, managing chronic disease, early detection of serious conditions, controlling costs, and coordination of care.

HEALTHCARE COSTS

Rising costs for drugs, therapies, equipment, technology, and wages for healthcare workers challenge healthcare providers to control costs without compromising patient care. CMS continues to push for healthcare price transparency to educate and inform consumers and to incentivize competitive healthcare pricing structures. Mandates to cancel elective healthcare procedures due to COVID-19 have profoundly impacted revenue streams for hospitals and other healthcare providers for 2020 and will continue into 2021. Data analytics is a key capability for tracking costs, evaluating worker productivity, streamlining workflows for greater efficiency, and developing predictive financial models, as healthcare leaders adapt current processes to manage COVID-19 impacts and plan for financial recovery.

POPULATION HEALTH

Advancing the health of communities and specific populations requires understanding and addressing clinical and social determinants, including underlying health conditions and genetics, as well as access to care, medications, nutrition, transportation, education, and community resources. Population health strategies shift the focus from acute episodic care to preventative care and chronic disease management. These strategies rely on access to data from disparate sources, including various health record systems used by providers across the continuum of care, claims systems used by health insurance payors, and databases with demographic information.

BIG DATA[2]

As noted by Turea (2020), big data has significant implications in the healthcare industry. According to SAS®, "big data is a term that describes the large volume of data – both structured and unstructured – that inundates a business on a day-to-day basis." Exploring big data for the purpose of uncovering insights that have not been previously considered or discovered is the foundation for healthcare innovation and transformation.

Areas of opportunity for leveraging big data include:

- Improving patient outcomes by helping doctors and other medical professionals efficiently and accurately diagnose and treat patients.
- Redesigning workflows for greater efficiency and allocation of resources where they are most needed.
- Driving innovation, such as increasing the speed of discovery for new drugs and medical treatments.
- Reducing the overall cost of healthcare. In fact, a research study of McKinsey and Company estimates that big data could save Americans between $300 billion to $450 billion a year.
- Identifying high-cost patients who may benefit from preventative healthcare or clinical navigation programs to effectively manage chronic conditions. According to the Healthcare Cost Institute Database, 17% of patients are responsible for nearly 75% of all health care expenditures.

CAREERS IN **HEALTHCARE ANALYTICS**

Healthcare leaders recognize that data is one of its most valuable assets, essential for developing integrated strategies to continually improve access to care, coordination across a wide continuum of services and providers, health outcomes, and operational efficiencies.

Healthcare leaders recognize that data is one of its most valuable assets, essential for developing integrated strategies to continually improve access to care, coordination across a wide continuum of services and providers, health outcomes, and operational efficiencies. They recognize that skilled analytics resources are vital for problem-solving, innovation, and transformational change, during this period of disruption and for longer-term growth sustainability.

Healthcare data analysts apply their knowledge of acquiring, organizing, evaluating, and modeling data to provide actionable information to clinicians, researchers, and decision-makers. There are numerous titles used across the healthcare sector for data analytics positions and job descriptions may vary considerably. Most data analytics jobs generally fall into three categories – business analyst, data analyst, and data scientist. In some healthcare organizations, the business analyst and data analysts' titles and functions are used interchangeably, creating a hybrid of responsibilities. Also, a new role has recently introduced by Gartner – the citizen data scientist – a "super user" of advanced analytics tools and software, but whose primary role is outside of data analytics and data science (Idoine, 2018).[3] Of these four roles, the business analyst role requires the least amount of technical skills, whereas the data scientist role requires the highest level of technical skills. The following descriptions provides a general overview of the responsibilities and skills needed for each category.

HEALTHCARE **BUSINESS ANALYSTS**

Healthcare business analysts are focused on solving current or future problems by facilitating solutions. They are instrumental in evaluating processes, determining process requirements, identifying areas of improvement, and developing and implementing solutions and optimization strategies to meet those requirements.

Additionally, the healthcare business analyst:

- Develops and manages project plans.
- Develops reports and monitors performance.
- Works collaboratively with stakeholders to make decisions.
- Documents and communicates insights, plans, and results to cross-function team members and management.
- Implements, updates, and maintains procedures.
- Performs quality and user acceptance testing.

HEALTHCARE **DATA ANALYSTS**

Data analysts tend to spend most of their time procuring and analyzing data and creating dashboards and reports to communicate findings.

The data analyst:

- Compiles and organizes large diverse data sets
  - Understands data storage and data management procedures for locating and retrieving data from disparate systems (e.g. Electronic Health Records, Enterprise Resource Planning (ERP), Enterprise Data Warehouse, and third-party products).
  - Conducts data set queries using a query tool such as SQL.
- Cleanses and validates data
  - Ensures an acceptable level of accuracy of data.
- Analyzes data
  - Evaluates data for patterns and trends.
  - Applies knowledge of mathematics, statistics, and data manipulation using tools such as SAS® or Minitab and/or programming languages such as R and Python.
- Prepares reports, dashboards, scorecards, presentations
  - Uses creativity to translate complex data into usable information and present it in a manner that can be easily understood by the target audience.
  - Uses visualizations to present data in a pictorial or graphical format so it can be easily interpreted and analyzed.
  - Automates internal and external reports.
  - Creates executive-level dashboards.

DATA **SCIENTISTS**

SAS® (n.d.) describes data scientists as "part mathematician, part computer scientist and part trend-spotter".[4] They have deep technical skills to solve complex problems and a natural curiosity to explore deeply for new learning. The data scientist role has gained momentum in recent years in acknowledgment of the highly technical and unique skillset needed to make sense of big data – to discover insights that can lead to breakthrough innovation and transformation.

Big data is so large, fast, or complex that traditional methods for exploring the data is insufficient, thus requiring deep technical expertise and tools. SAS® (n.d.) outlines three common V's used to describe big data (volume, velocity, and variety), plus two additional dimensions considered at SAS® (variability, veracity).[5]

- High volume – data from a variety of sources, including healthcare records, smart devices, equipment, videos, social media and more
- High velocity – data continuously streams into business at an unprecedented speed
- High variety – includes all types of structured (e.g. traditional, numeric) and unstructured formats (e.g. text documents, emails, videos, audios, financial transactions and more)
- High variability – unpredictable data flows, such as trends in social media or seasonal or event-triggered data
- High veracity – data quality when linking, matching, cleansing, and transforming data from across many different sources

SAS® (n.d.) describes the typical duties for data scientists:

- Collects large amounts of unwieldy data and transforms it into a more usable format
- Looks for order, patterns, and trends in data
- Solves problems using statistics and complex data techniques
  - Machine learning – artificial intelligence based on mathematical algorithms and automation
  - Deep learning – a branch of artificial intelligence that mimics the human brain for processing information
  - Text analytics – examination of unstructured data, such as sentiment data or free text narratives
- Proficient with programming languages (e.g. SAS®, R, Python)

CITIZEN **DATA SCIENTIST**[7]

According to Idoine, the citizen data scientist leverages advances in analytical software and tools, addressing a shortage of data scientists in the job market. The citizen data scientist's primary job function is outside the field of statistics and analytics, but they are "power users" who can perform simple or moderately complex analytical function and create or generate models using advanced diagnostic analytics or predictive and prescriptive capabilities. The citizen data scientist does not replace the data scientist, who has advanced data science expertise, but they bring their own domain expertise to the process.

ANALYTICS-ENABLED **LEADERS**

PwC notes that many leadership and executive positions now require a competency with data analytics, in addition to specific domain or functional knowledge outside of data analytics.[8]

These analytics-enabled roles enable data-informed decision making and integration of data-driven insights into clinical and operational processes for greater productivity and operational efficiencies. Examples of analytics-enabled roles include Chief Data Officers, Chief Analytics Officers, Chief Strategy Officers, and other leaders in Information Technology, Human Resources, Finance and Marketing.

To illustrate, an analytics-enabled leader may assist with identifying customer wants using social analytics, detecting unusual network activity from real-time dashboards, or forecasting inventory using predictive analytics. These roles require experience with reporting and visualization software to assist with the collection and evaluation of data, in addition to an expertise in marketing, IT, and supply chain management, respectively.

Analytics-enabled roles include as examples:

- **CHIEF DATA OFFICERS**
- **CHIEF ANALYTICS OFFICERS**
- **CHIEF STRATEGY OFFICERS**
- **LEADERS IN IT, HR, FINANCE & MARKETING**

VALUABLE **REQUIREMENTS**

EDUCATION/ EXPERIENCE

A minimum of a bachelor's degree is required for most entry-level data analyst jobs, ideally in mathematics, statistics, or computer science. Those wishing to become a business analyst should consider a master's degree in healthcare data analytics, in addition to a bachelor's in their primary domain (i.e. marketing, human resources, healthcare administration). While a bachelor's degree may be adequate for some roles, a master's degree is often required for data analyst and data scientist roles. In fact, 39% of Data Scientist and Advanced Analyst job positions require a master's or Ph.D (Markow, Braganza, Taska, et al, n.d.)[11]

SOFT SKILLS MATTER

Analytics professionals work in multidisciplinary environments, which necessitates working effectively in teams and with stakeholders from all levels of a healthcare organization. This could include executives and other leaders, physicians, nurses, ancillary staff such as radiology or lab, support staff from finance, IT, human resources, and more. As such, soft skills related to problem-solving, critical thinking, and communication are highly sought after.

Healthcare data analysts have a passion for solving complex problems and a curiosity about what discoveries their analysis might reveal. They anticipate the questions that stakeholders may ask and seek to provide answers to those questions. They use critical thinking skills to detect patterns and trends and draw conclusions based on their findings. They are attentive to detail. They work collaboratively within teams as well as independently.

Communication skills are essential for the healthcare data analyst to translate complex information into terms others can easily understand. The healthcare data analyst communicates effectively both verbally and in written form, demonstrating creativity with visualization methods and data storytelling to share complex ideas and findings. When reviewing analysis and findings with stakeholders, the healthcare data analyst will inevitably be asked questions to clarify or even challenge the information. The healthcare data analyst may need to defend his data and findings, understanding that there may be different perspectives and not taking questions personally. Also, the analyst is open to modifications or additional analysis that may be requested.

MARKET DEMAND

JOB OPPORTUNITIES ABOUND FOR HEALTHCARE DATA EXPERTS IN TODAY'S MARKET.

- Glassdoor (n.d.) lists data scientist, business analyst, and data analyst in its Top 50 jobs for 2020:[9]

#3 DATA SCIENTIST
(median salary of $107,801/year)

#26 BUSINESS ANALYST
(median salary of $73,022/year)

#44 DATA ANALYST
(median salary of $62,973/year)

- According to IBM, the fastest-growing roles are Data Scientists and Advanced Analysts, projected to have increased by 28% between 2017 and 2020 (Columbus, 2017).[10]

Healthcare data analysts work in a variety of environments:

- **HOSPITALS AND HEALTH SYSTEMS**
- **LARGE PHYSICIAN PRACTICE GROUPS**
- **HEALTH INSURANCE PAYORS**
- **INFORMATION TECHNOLOGY VENDORS** including those offering Electronic Health Record systems (EHR)
- **FEDERAL AND STATE DEPARTMENTS AND AGENCIES** such as National Institutes for Health (NIH), Centers for Medicare and Medicaid Services (CMS), and state departments of public health
- **HEALTHCARE CONSULTING COMPANIES** specializing in technology, operational improvements, patient experience, and more

EDUCATION COLLABORATION

AVERETT UNIVERSITY AND VCOM PARTNERSHIP

Averett University, in collaboration with Edward Via College of Osteopathic Medicine (VCOM), offers an exclusive Master of Science degree Applied Healthcare Data Analytics (MSAHDA) (Averett, 2019).[12] This online program will help prepare students to use data and analytics to solve significant problems facing the healthcare industry.

This program is designed for working professionals, providing a flexible online format to teach students how to organize and manage medical information as an essential part of the efficiency and delivery of quality healthcare. A graduate with a MSAHDA degree will possess imperative business fundamentals, industry context and advanced data analytics to not only comprehend data, to also inform better decision-making within healthcare organizations.

The Master of Science in Applied Healthcare Data Analytics is for recent graduates from regionally accredited undergraduate programs to longtime professionals looking for a competitive edge, new skills, and opportunities to best use data informed practice.

The program is formatted for intense study and accelerated completion online. Most students take one eight-week course at a time, two courses per term with three terms per year. This allows for degree completion in less than two years. Small classes allow for productive discussions and personal attention from instructors.

SAS® PARTNERSHIP

Averett University has partnered with SAS® through its Academic Programs Unit to integrate SAS® into its curriculum. This partnership provides students and instructors with free access to software including SAS On-Demand for Academics and SAS® VIYA for Learners, and numerous free e-learning opportunities through the SAS® Academic Hub. Students who successfully complete (with a grade of "B") in each of four specific analytics courses will earn an electronic badge from SAS®.

DR. TIFFANY M. FRANKS **AVERETT UNIVERSITY PRESIDENT**

"We believe this program will prove relevant for the healthcare industry and make graduates more marketable to hospitals and other healthcare organizations. We know that VCOM has expertise in creating specialized programs, research and cutting-edge techniques that have helped shape the overall healthcare industry, and coupled with the solid foundation of our existing applied data analytics program, we are confident that this collaboration will make for a competitive program."[13]

DR. DIXIE TOOKE-RAWLINS **VCOM PRESIDENT**

"Advancing scientific knowledge through research is part of our mission and strategic goals at VCOM. Priorities here focus on population-based research, primary care delivery and efficacy of care—all elements that are integral to applied healthcare data analytics. The value of this data in evaluating the outcomes and delivery of services to patients is vital in the future of providing high-quality, compassionate and affordable care." [14]

JOHN G. ROCOVICH JR. **CHAIRMAN, VCOM BOARD OF DIRECTORS**

"The Master's program that Averett University and VCOM developed will help its program graduates make an immediate impact within their healthcare organization. Data analytics is positioned to play a major role in the future of patient care and the healthcare industry."[15]

CORE COURSES & CREDITS

Course#	Course Title	Credits
IDS 501	Principles of Adult Learning	1
ADA 501	Thinking Analytically	3
ADA 502	Foundations of Analytics for Management	3
ADA 503	Applied Data Mining	3
ADA 504	Advanced Applied Descriptive Analytics for Decision Making	3
ADA 505	Advanced Applied Predictive Analytics for Decision Making	3
ADA 511	Introduction to Healthcare Systems Data Analytics	3
ADA 512	Legal, Ethical Aspects of Healthcare Data Analytics	3
ADA 513	Visual and Verbal Analytics Communication	3
ADA 514	Healthcare Operational Research	3
ADA 510	Analytics Capstone Course/Project	3
Total credits required for graduation		31

Courses and requirements subject to change

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13. *Ibid.*

14. *Ibid.*

15. Ibid.