SECTION I

Overview of Population Health Analytics

CHAPTER 1

Introduction to Population Health Analytics

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PERSPECTIVE AND CONTEXT

Population health is an evolving discipline, one that draws on the intersection of many fields of study, including public health and policy, medical and clinical care, economics, healthcare administration, biostatistics, environmental science, social and psychological sciences, and more. For the purposes of this textbook, *population health* is defined as the "distribution of health outcomes within a population, the health determinates that influence this distribution and the policies and interventions that affect the determinants" (Kindig & Stoddart, 2003).

Unlike other developed countries around the world, managing the health of the population in the United States is uniquely challenged by fragmented and disparate healthcare systems, misaligned profit incentives, and a focus on cost and utilization over improved health outcomes. As such, standardized healthcare data representing the entire U.S. population is either unavailable or difficult if not impossible to access. When accessible, publicly available population-based health and household data sets are often not generated at the person level and do not link to data derived from the healthcare marketplace. This set of challenges, combined with the potential solution of population health management, creates a unique opportunity to define a set of standards, protocols, and best practices for performing analytics to support population health management in the United States. This is the focus of this textbook.

This textbook outlines a structured process and standard approach to performing population health analytics that closely aligns with the delivery of evidence-based health care. This process is proposed through a series of phases, each phase contributing to the goal of simultaneously improving the health outcomes of the population and financial outcomes of health care providers. Each phase of the population health process outlined in this textbook includes the building blocks, options, advantages, disadvantages, and best practices to practically and successfully implement analytics to create information that can be used to drive decision-making, stimulate action, and achieve results in healthcare organizations. Also included are primary analytic techniques, methods, data outputs, and industry best practices used in health care and clinical analytics today.

This textbook focuses on the *practical application of population health analytics and is best applied in healthcare organizations currently managing healthcare cost by providing healthcare services in the form of population-based clinical interventions and programs.* Although applicable in many ways, this textbook is not

targeting the audience of community health, public health, healthcare research, employer-based health care, or healthcare innovation. The goal of the editors and authors of this textbook is to share years of learnings from applying population health theory (as opposed to explaining it) and provide learnings from real-world practical experience to assist users in moving from population health theory to its application in analytics quickly and effectively. The information in this textbook is provided by leaders across the healthcare industry who have first-hand experience in working with healthcare data and population health management theory to improve health outcomes and lower its cost. At times, this book provides prescriptive actions for the user to take that stem from the learnings of the authors, and are meant to be used to avoid known pitfalls of applying population health theory to real patients in real clinical settings, to motivate action, and to leapfrog healthcare organizations into data-driven population health informed decision-making.

Population Health Analytics (PHA)

Effectively managing the health of any population is made possible by transforming data into information, gleaning insights from the information, and translating those insights into action. Data can be aggregated and used to support various clinical care processes in populations in the same way that a clinician's stethoscope is used to diagnose various health conditions in individual patients. Just as a clinician's stethoscope can detect individual sounds from different body parts at different times throughout a patient's lifetime to provide a diagnosis, individual data collected at multiple points of time and engagement with the healthcare system can be aggregated into actionable information that can be used to improve the health of an entire population. The distinction between a clinician's stethoscope and aggregated data insights is in their applicability. For instance, where an individual's heart sounds are used to determine the treatment and prescription for one patient, the range and mean of heart sounds in a population are used to determine evidence-based programs for groups of patients with heart conditions.

For the purposes of this textbook and to create a standard definition for healthcare, *population health analytics* (PHA) is defined as the following:

> The systematic computational transformation of data into information to assess populations, identify health outcome determinants, predict and prescribe preventable health conditions and events, drive decisions in the development, implementation and optimization of population-level interventions, and to monitor and evaluate results.

PHA requires the optimization of robust data sources; the application of business, clinical, and financial context and meaning to data; rigorous analytic and epidemiologic methods; an interdisciplinary approach; and a structure and process designed to meet the strategic objectives to improve the population's health and the financial performance of the healthcare organization.

This text is organized into an introductory section and eight sections that build on each other to achieve population health analytic objectives. Throughout the textbook there are "Applied Learning" case studies and use cases that provide the learner with opportunities to relate concepts to real-life scenarios. Case studies demonstrate concepts, whereas use cases present scenarios and ask the learner to respond to a set of questions.

Section I: Chapter 1: Introduction & Chapter 2: Guiding Frameworks for Population Health Analytics

The first section of the textbook covers the broader context of population health. Following this introductory chapter, Chapter 2 introduces the ForestVue Population Health Implementation

and Analytics Framework, which serves as both a stepwise process to implement population health concepts and a guide for deploying analytics across the population health continuum. Incorporating leading definitions of population health, the Triple Aim, and evidence-based practice, this framework follows innovative scientific methods and provides a practical translation of these methods into a seven-phase process that carefully outlines the analytics needed at each step to successfully transform an idea to results. Also covered in this chapter are analytics capabilities needed to truly support population health management.

Section II: Data Sources

Population health management seeks to obtain person-level data from multiple data sources on an ongoing basis to develop evidence-based strategies directed at reversing negative trends in the health status of a defined population that have been shown in the health literature to lead to overall increased costs, inappropriate use of healthcare services, and overall decline in the health of the population.

Chapter 3: Medical Administrative Claims Data for Population Health Analytics

Medical claims data are generated when providers and healthcare facilities bill payers for the provision of healthcare services to patients. In this chapter, data structure, lineage, and coding systems are described. The value of medical claims data for use in population health analytics is expressed, and ways of using medical claims data to answer questions of importance to population health management are examined.

Chapter 4: Lab Data for Population Health Analytics

Clinical lab data reports the results of any type of test done on samples such as blood or tissue and are used to identify diseases or other conditions and can be used to monitor a person's overall health to cure, treat, or prevent disease. Lab data are one of the most complex sources of data to use in population health analytics because of the wide variation of data structures and reporting and lack of standardization. This chapter describes the sources and structures of lab data, describes techniques for transforming lab data into meaningful information, explains the value of lab data, and identifies ways to use lab data to answer questions of importance in population health.

Chapter 5: Pharmacy Data

Pharmacy data are derived through patient treatment encounters with the healthcare system, either those that result in a prescription being generated or those associated with filling a prescription. Medications that require a prescription from a healthcare provider or dispensing from a local pharmacy create administrative records that generate pharmacy data for analysis. This chapter describes common sources of pharmacy data used in population health analytics, including a description of how data sets may vary and be used differently based on source system. Common coding systems used for pharmacy data are described, along with applications of pharmacy data in analyses.

Chapter 6: Electronic Medical Record Data for Population Health Analytics

Data from electronic medical records (EMRs) are vast and varied and include any information that is collected to describe patients' health and treatment histories. EMRs are transactional systems containing data collected during healthcare delivery to patients and can be repurposed for population health analytics. This chapter describes the structure of an EMR database and provides examples of the types of data found, demonstrates how EMR data can be used to answer questions of interest in population health, and explains the advantages and disadvantages of using EMR data for population health analytics in comparison to other data sources.

Chapter 7: Social and Behavioral Data

Social determinants of health (SDOH) are the conditions in which people are born, grow, live, work, learn, worship, and play (World Health Organization, 2017). Given that the majority of healthcare organizations only have data related to the delivery of clinical care services, data about the SDOH are the most difficult to include in population health analytics. This chapter explores data sources that measure SDOH and ways in which to include these data in analyses used to understand the health of populations. Data structures and attempts at standardization are described and a case study is presented.

Section III: Data Contextualizers

Adding context to population health data can be an effective way of focusing analytic efforts to identify actionable opportunity to improve health and reduce unnecessary healthcare costs. Many methods exist to apply context by grouping data into discreet areas of opportunity. Applying context to population health data can be used to simulate the healthcare experience, provide decision support to clinicians at the point of care, and understand service patterns and trends. Section III of the textbook broadly introduces the use and application of data contextualizers and goes deeper into those contextualizers that are commonly applied in population health analytics.

Chapter 8: Grouping, Trending, and Interpreting Population Health Data for Decision Support

This chapter introduces the concept of grouping data into different focus areas of opportunity, provides a general overview and comparison of data groupers available in the marketplace, and highlights examples of how population health data with context can help aid executive strategic planning, business decision-making, and clinical decision support. Data contextualizers are framed in the context of the Triple Aim of improving the health of populations, enhancing the experience and outcomes for populations, and reducing per capita cost of care (Berwick, Nolan, & Whittington, 2008). This chapter also reviews the cautions that must be considered when applying context by grouping population health data because the information from these data can easily be misinterpreted.

Chapter 9: Grouping, Trending, and Interpreting Population Health Data for Receptivity, Engagement, and Activation

Patient engagement is an important aspect of building impactful population health solutions. Combining demographic, consumer behavior, and health determinants with clinical and financial data can enable a deeper understanding of patient engagement and further the development of analytic models that predict a patient's willingness and readiness to participate in a particular clinical program or intervention. This chapter outlines how adding receptivity, engagement, and activation context to data can enhance patient relationships, promote personal responsibility, detect selection bias, and support planning, prioritization, and triage in the most effective program or intervention that can provide the most benefit. Also included in this chapter are examples of how data and analytics can align a patient's engagement with clinical and behavioral health-improvement programs, and clinically and financially impact monitoring and evaluation metrics to measure performance.

Chapter 10: Grouping, Trending, and Interpreting Population Health Data for Assessing Risk and Disease Burden

Robust clinical categorizations of clinical conditions are a staple of population health management and analytics. This chapter discusses the use of clinical,

financial, health determinants, and supplementary data to assess and stratify populations into varying risk categories; identifying patients with understated, suspected, or rising risk that can lead to worsened health outcomes; and how to adjust for risk and disease burden when identifying patients for select clinical programs or interventions and in reporting outcomes. Additional information included in this chapter is the context that can be applied to data to identify coding patterns for suspected clinical conditions, verify patients' existing conditions, assess severity of illness, determine status of control of clinical indicators for illness, monitor morbidity and mortality trends, and predict future cost, utilization, and worsening health outcomes.

Chapter 11: Grouping, Trending, and Interpreting Population Health Data for Waste and Inefficiency

Variation in the provision of medical services is significant, and clinical and administrative reduction is a strong focus of many healthcare organizations seeking to reduce unnecessary services and waste in health care to achieve financial success and optimize health outcomes. This chapter looks at the ways data can be grouped into clinical episodes of care, evidence-based practice of medicine, and clinical and administrative care pathways to identify diagnostic and clinical errors, administrative and transactional waste, and promote cost-effective and cost-efficient programs and interventions.

Section IV: Creating the Population Health Data Model

Population health management is made possible through the translation of data into meaningful information. Aggregated data are used to carry out clinical processes of care in a population in the same way that the tools of the clinician are used in the clinical process of care for individual patients. Individual data collected at multiple points of contact within the care system are aggregated to understand the health of an entire population. The population health data model (PHDM) provides the necessary data infrastructure for readily assembling individuals into populations of interest, understanding health determinants and key drivers of outcomes, and measuring outcomes of the Triple Aim. This section is split into two chapters that describe the use-case–based approach for delivering incremental value in the PHDM, explains the process for developing the PHDM, and presents the core structure and components of the PHDM.

Chapter 12: Development of a Data Model

Data models in population health are complex and highly technical, requiring a prototyping approach to development where incremental executable portions of the model are delivered for use and acceptance. When done well, a strong data-modeling architecture is flexible because it can accommodate changes when business rules and clinical logic changes. The goal of data modeling in population health is to optimize the ability to perform the analytic functions in support of the population health process. This chapter describes key components of the approach to use when developing data models for population health management. A use-case–based approach is taken to help prioritize the layering of high value data assets into data model development. Agile project management supports the use of prototypes in developing population health data models. The process of moving from conceptual to physical to logical data models allows all stakeholders in the model the ability to actively participate, with all of them understanding the important roles they play in developing a high functioning data model.

Chapter 13: The Population Health Data Model

Although a population health data model is developed with specific organizational goals in mind, all population health data models share basic features. These features make up the core of the data model. At its core, the model has person-level

observations from multiple data sources at equally distant points in time that can be aggregated to an entire population and segmented by smaller subgroupings. This chapter describes the core components and functionality of a population health data model, proposes a process for developing the model, and provides an example of a conceptual model. With these basic principles in mind, stakeholders and resources can be organized to develop a population health data model that is uniquely tailored to unique organizational strategy, data availability, and technical capabilities.

Section V: Data Infrastructure

Analytic infrastructure refers to tools, services, applications, and platforms that support analytic processes and the constellation of analytic products from simple reports to data models to estimating and validating models that diagnose conditions, predict adverse outcomes, or prescribe action. Databases, data warehouses, statistical and data-mining systems, scoring engines, grids (computers that interact to coordinate data processing) and clouds (Grossman, 2009). The best analytic infrastructure uses standards-based procedures for data processing; appropriately applies technology like grids and cloud-based services to support large volume, high-velocity, and variety of data; supports analytics for the entirety of the organization; is nimble in supporting new and innovative analytic undertakings; and fully integrates systems data (Grossman, 2009; Halper & Stodder, 2014). This section is split into five chapters that detail the process and options for data warehousing, describe data-preparation techniques, demonstrate methods for assessing the quality of data, and delineate a process for person-level identity management.

Chapter 14: Options for Warehousing Data for Population Health Analytics

A data warehouse environment is built to hold historical data integrated from several source systems, often operational, in an organized manner. Operational systems are built for specific functions and traditionally are not built to serve the purpose of data analytics or data mining. To support the activities of population health analytics, new environments must be created to merge the population health data from these systems and other more traditional data sources into one central area called a *population health data warehouse system* for overall enterprise use. This chapter describes the ways in which a data warehouse supports population health analytics, identifies the components of and alternatives for a comprehensive data warehouse, identifies factors that affect the choice of a data warehouse, and analyzes the implications of this choice.

Chapter 15: Process for Warehousing Data for Population Health Analytics

This chapter describes the basic processes associated with building an effective data warehouse and the additional processes that are required to effectively support population health analytics and management. Resolving data inconsistencies, denormalizing, or normalizing data, and inserting frequently used calculations and definitions are critical aspects of the process for warehousing data to support population health analytics. This chapter also includes best practices to incorporate and pitfalls to avoid when optimizing the data to support a population health data model, framework, and the maturation of analytics over time.

Chapter 16: Data Management and Preparation

The majority of data used for population health analytics is secondary data, meaning that the data were collected for a purpose other than understanding the health determinants and

outcomes for populations and subgroupings. As such, these data are rarely, if ever, fully prepared to answer questions of interest and execute on improving outcomes in population health. This chapter provides a broad overview of the ideal state of data preparation where robust master data management (MDM) processes are in place to manage person-level identification, linking of data files, and scouring of data fields for acceptable levels of data error. Absent MDM, the chapter describes a process to handle some of the most commonly found errors in data when performing population health analyses, offers methods for managing these issues, and encourages placing these methods into automated processes.

Chapter 17: Assessing Data Quality

Building a sustainable data infrastructure for population health requires an understanding and monitoring of the quality of data assets. Accurate measurement of health determinants and outcomes rely on the presence of high-quality data as does the decisions made to inform the financial viability of healthcare organizations using these data. This chapter defines the domains of data quality and their ability to assess the value of data in their entirety, demonstrating the ability of data points to represent their intended meaning completely and accurately in a timely manner. Emphasis is placed on a data profiling approach to data quality evaluation where proactive measures are put into place and regularly monitored, and results are used to improve data quality.

Chapter 18: Person Identity Management

Achieving the Triple Aim requires reduced waste and inefficiencies in the healthcare system. Because of poor patient-identity management, healthcare dollars are needlessly spent on duplicate testing, multiple submissions, and rejections to payers from providers; the wrong results given to the wrong person; and, much worse, wrong treatments are provided to patients. The importance of matching data at the person level for population health analytics and the enormity of the challenges in doing so cannot be understated. The methods of patient-identity management and master data management are used in this chapter to solidify the tenants by which unique person identification can be optimized and maintained for population health analytics.

Section VI: Analytic Methods

The population health process critically depends on the ability of analytics to inform each phase of the population health framework. When providing care to individuals, clinicians use data points about patients to make diagnoses and determine appropriate treatments. At the population level, data points that are aggregated into analyzable data structures are necessary to understand health determinants and determine the appropriate interventions for improving outcomes. Multiple analytic methods are applied to turn these data into information and insights. This section is presented in six chapters that provide an overview of analytic methods and detail the methodologies for epidemiological, risk adjustment, predictive analytics, prescriptive analytics, statistical process control, and other advanced techniques.

Chapter 19: Overview of Analytic Methods Used in Population Health Management

Each phase of the population health framework requires certain analytic methods to glean insight and understanding in executing during that phase. Analytic methods refer to the calculations, statistics, and models developed from data that facilitate the transfer of data to knowledge and wisdom. Although some methods can be used in

multiple phases of the population health process, many are primarily used in specified phases and are key to gleaning the necessary insights within a phase. This chapter provides an overview of analytic methods commonly used to execute in each phase of the population health process. A description of the methods is provided and framed within the processes of population health.

Chapter 20: Epidemiological Methods

Epidemiological methods allow the ability to understand the "distribution of health outcomes" within a population, one of the main components of the definition of population health management (Kindig & Stoddart, 2003). In addition, epidemiologic methods form the basis of and are used to validate more complex analytic methods in population health, including risk adjustment and predictive modeling. This chapter focuses on the discipline of epidemiology and its analytics methods, which form the basis for answering questions of interest in population health management and is presented in a way that focuses on applications specific to population health analytics.

Chapter 21: Risk Adjustment

Risk adjustment is a way of controlling for observable differences between patients when paying for the health care of those patients and is widely used in population health management. Although used for many different purposes in the population health process, it is mainly used to set payments to health plans that reflect the expected cost of providing health insurance to their members. In other applications, governments, health plans, and other payers in health care will also apply risk adjustment when paying for value (versus paying for services rendered) when measuring outcomes and comparing health systems and providers and when measuring the impact of population health interventions (Schone & Brown, 2013; Schokkaert & Van de Voorde, 2009). This chapter introduces the concept of risk adjustment and important considerations for risk-adjustment methodology. A case study is used to apply these concepts in population health analytics.

Chapter 22: Predictive and Prescriptive Analytics

Using mathematical theory and data to estimate outcomes that cannot immediately be measured, predictive analytics is touted as one answer to addressing health needs in populations and improving outcomes when the need is to identify future beneficiaries (Brown, 2018). Similarly, prescriptive analytics—which moves the question of predictive analytics that is "what will happen" to "what should I do"—is seen as the pinnacle of analytic capabilities for which many healthcare organizations strive. This chapter identifies methods used in the development of risk prediction models and their validation, distinguishes between predictive and prescriptive modeling, describes applications of predictive and prescriptive modeling in population health, and summarizes key decision points for decisions around using these methods in practice.

Chapter 23: Advanced Analytic Methods

Advanced analytic methods have the potential to disruptively change the way health care is delivered. Advanced analytical techniques are applied to what is considered big data in terms of large volume, variety, velocity, and veracity through the process of knowledge discovery in databases (KDD). This chapter distinguishes between key terms used in pattern-based risk modeling, describes the KDD process, identifies common machine-learning techniques applied in population health analytics, and describes natural language-processing methods. Techniques are presented in terms of their applicability to population health analytics, and methods for assessing feasibility are presented.

Chapter 24: Run Charts and Statistical Process Control

Statistical process control (SPC) is a method used to understand when population health initiatives are stable in that they are running as planned and also to understand when intentional improvements are meeting set targets. A monitoring strategy using SPC as the methodology prepares the analysts and intervention leadership to make ongoing adjustments to improve or keep processes stable and informs business leaders about the value of investments. This chapter describes SPC methods and the ways in which they are used to monitor metrics of interest in population health and demonstrates the use of SPC in population health management.

Section VII: Analytics Support for the Population Health Process

Previous sections of this textbook outline the concepts, frameworks, assets, tools, methods, and processes that are needed to effectively perform population health analytics. This section focuses the reader on population health analyses that are commonly used in real-world healthcare administrative and clinical settings across the United States. Assessing the health, segmenting, monitoring, and intervening with populations is core to population health analytics and is discussed in the following four chapters. An additional important chapter included in this section focuses on the basic principles of using storytelling to effectively communicate population health analytic derived opportunity and urgency to a variety of clinical and nonclinical audiences.

Chapter 25: Assessing Populations

A population health assessment stems from the identification of problems in health care, many of which are complex and multifaceted. U.S. healthcare delivery organizations, payers, governments, and other independent organizations regularly monitor pertinent health indicators and resource utilization. An unexpected rise or fall in these indicators often triggers the need to understand more deeply the unique characteristics of the affected population and the health determinants that impact care, cost, and utilization. This chapter outlines the process to identify the types of challenges in health care that lead to the need for a population health assessment, defines data and non-data elements necessary for the assessment, and details the process steps required to comprehensively assess a population's health to identify opportunities for health improvement. This chapter also introduces the concept of using person-centered analytics to assess the health of a population.

Chapter 26: Targeting Individuals for Intervention

The crux of improving health outcomes while reducing healthcare costs and utilization is being able to identify the small groups of high-needs patients and intervene to prevent superutilization and strive for a more normally distributed curve of healthcare spending. This chapter brings together an understanding of population health data sources and structures, risk-prediction modeling, population assessment, and linkages between health determinants and health outcomes to explain the application of identifying, stratifying, and segmenting populations for intervention.

Chapter 27: Analytics Supporting Population Health Interventions

A variety of analytic methods and techniques exist to support the development and application of cost-effective, cost-efficient, and evidence-based clinical and administrative interventions. This chapter outlines the elements of successful population health interventions using analytics and highlights several examples of how clinical and

population health analytics can enhance the development and deployment of interventions across population subsets. Also included are approaches to developing effective population health interventions, best practices, and pitfalls to avoid when using analytics to develop and deploy interventions and additional resources for engaging clinicians and patients.

Chapter 28: Monitoring and Optimizing Interventions

As the intervention progresses from initiation to steady state, monitoring takes place to ensure that the intervention is being delivered as intended and that progress is being made toward achieving desired outcomes. During this phase, all stakeholders have a role in reviewing and interpreting reports about the interventions. This chapter describes the multiple vantage points for monitoring the results of population health interventions with examples of the types of reporting to meet the needs of each. Intervention monitoring is framed within the context of quality improvement and evidence-based practice processes. Process and outcome measures of interest to population health interventions are suggested along with a case study.

Chapter 29: Storytelling with Data

Those who practice in population health, including analysts, are endowed with an abundance of data. This chapter explains how one can surround data with compelling stories in service of impact and asserts that another set of tools, those of storytellers, strongly complement analytics. A well-crafted and well-told story has the capacity to extend the reach and the impact of science and analytics. Impactful stories seize and hold the attention of the target audience and bring that audience into the world of the characters. This chapter discusses the role of story in society, explains the ways storytelling affects the brain, introduces the basics of good story, describes the best practices and devices of effective storytellers, explores the elements of effective stories and their ability to create credible narrative in population health, and applies storytelling to presentation of analytics and results.

Section VIII: Creating the Culture in Organizations

Integral to effectively managing the health of a population is the healthcare organization's commitment to the community of patients it serves; the accountability of the organization, its clinicians, and patients to mutually engage in preventing disease and unnecessary care; and the capability of the organization to provide the skills, tools, and services that enable a data, analytics, and information-driven organizational culture. This section establishes a proven method for assessing an organization's capabilities and readiness to adopt a culture of data-driven informed decision-making and proposes several best practices for organizing teams to lead the promotion and integration data and analytics across multiple disciplines, departments, and divisions within an organization. The section ties important concepts throughout the textbook together through clinical workflow transformation. The section and text conclude with one of the most important and least considered topics in population health analytics that are the ethical principles that guide this important work.

Chapter 30: Assessing Organizational Capabilities for Population Health Analytics

Utilizing a framework to assess an organization's population health analytic capabilities creates a standardized method to identify specific areas for improvement and potential future strategies.

This chapter describes a framework for assessing organizational capabilities to execute on population health analytic objectives and achieve desired results. Capabilities are described in terms of structure, process, and outcome according to the framework laid out by McDonald et al. (2007). Publicly available organizational assessments are explored, and an organizational assessment tool is proposed.

Chapter 31: Building a Team Culture for Population Health

Analytics to support population health cannot be developed properly without a team-based approach. Solutions built in isolation or from one person's expertise often cannot be generally applied to populations or scaled. Building a team for population health analytics is essential to ensure the success of the solution. This chapter outlines the importance of a team and its application to population health management and analytics, and it introduces the PopHealth Troika (PHT)™, a method for identifying the right team members, setting clear roles and expectations, realizing each team member's potential, building trust, creating shared understanding, and practicing open communication to transform the way health care is delivered to achieve extraordinary results. Also discussed are tactics to create a safe space for team members to simultaneously innovate and learn, set clear performance goals, define the scope of work and stick to it, and challenge one another's assumptions with respect to the betterment of desired results.

Chapter 32: Skills Assessment of Population Health Analysts

Analytics and analysts are central to success in population health analytics; therefore, an organization must identify, develop, and retain the talent needed to support this work using job descriptions and skills assessments to manage this critical function. Skills assessments are designed to provide a best practice methodology for measuring and understanding workforce skills. The process supports an effective skills-management practice, and the value is delivered through aligning a company's most important asset, its people, with its ability to deliver meaningful and targeted outcomes. This chapter focuses on three areas of the skills assessment process: (1) defining the components of a skills-assessment framework and process, (2) identifying the analytic and business skills that support population health analytics, and (3) how skills assessments can be implemented for success within organizations.

Chapter 33: Clinical Workflow Transformation

Population health management and analytics requires that a different approach be taken when delivering healthcare services to patients. Population health seeks to address the total cost and quality of care with a proactive approach to health optimization as opposed to a status quo reactive approach of symptom management and procedure-based care. At a system level, the way care is delivered becomes a fundamental building block to successful management of populations. Several considerations need to be clearly articulated to implement a population health approach, and few rise to the level of importance than transforming the clinical workflow. This chapter highlights examples of how organizations have incorporated best practice steps to transform the way healthcare services are delivered to a population. It seeks to describe the common elements and building blocks of clinical workflow transformation and discusses key issues, resource requirements, information technology, and data and analytics that can impact clinical workflow development. Additionally, it applies population health concepts and methods to clinical workflows to transform healthcare services.

Chapter 34: Ethical Principles for Population Health Analytics

Population health analytics makes data readily available at the person level to make inferences about the factors impacting health outcomes, determine which health interventions are best suited to healthcare needs in the aggregate, predict adverse outcomes, and make decisions about the allocation of healthcare resources. Data-driven decision-making in population health is plagued by restrictions in data availability at the person level, leading to a limited ability to understand the complexity of problems in health care, ensure the inclusion of diverse subgroups of populations, and measure a constellation of health determinants in addition to those that are clinical in nature. For these reasons, it is important to be intentional in addressing ethical concerns in population health analytics. This chapter focuses on the application of ethical principles to population health analytics, presents pertinent use cases, and suggests methods to incorporate ethical principles purposefully and regularly into population health analytic processes.

Conclusion

Population health is a dynamic and evolving field of study, and a career in population health analytics can be a fulfilling and powerful way to participate in developing insights and solutions to the challenges that exist in health care today as well as directly and positively impact the health and well-being of the population. This book was crafted with the learner in mind and is meant to expose students at every level of the discipline and relatively new practitioners in this field to learnings, experiences, challenges and successes from the practical application of population health concepts, methods, and principles on existing populations across the United States.

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