PREVIEW

# PRECISION MEDICINE AND HIT
## NEW DATA, NEW CHALLENGES

A Chilmark Research

**FUTURE of CARE REPORT**

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# Executive Summary

Precision medicine (PM) is slowly entering the mainstream of health and medical discourse but is still a term in need of concise definition to move beyond the origins in genomics to the present, where PM must also encompass population health management.

***The most effective manner to build a bridge between past and present is to define PM as an "effort to collect, integrate, and analyze multiple sources of genetic and non-genetic data and applying data analytics and machine learning/AI to develop insights about health and disease that are tailored to an individual."*** [1]

There has always been a tension between medicine based on the response of the average of a population and medicine based on the needs of the individual. PM promises new therapies based on an individual's characteristics and lifestyle. The goal is to improve health monitoring, optimize pharmaceutical interventions, and contribute to better population health interventions.

Long-term success in PM will demand a great deal of innovation in new business models that can create sustainable revenues as biopharmaceutical companies move from the one-size-fits-all paradigm to products and services that address much smaller markets. As digital biomarkers that identify sub-populations for targeted therapies become more mainstream, the evidence base to support payment mechanisms will need to be developed across the industry in a manner that fits within the emergence of value-based payment dynamics. The first step in moving in this direction is developing better ways to integrate the new biological insights from -omic R&D into the point-of-care that is actionable for clinicians and patients. However, doing this is not an easy task with today's health IT infrastructure.

PM has the potential to change the way we conceptualize disease based on insights at the molecular level as the fundamental knowledge of biology linking genetics, microbial flora, neuroscience and even quantum biology progresses. This, however, is a long-term process that will span the coming decades. In the near term, we will see steady progress in basic insights that -omic fields produce; however, clinicians and patients will need to balance substantial uncertainty across many diseases, especially in cases of co-morbidities, and still leave room for the play of subjective interpretations nested in these new forms of data.

Integrating the rapidly growing but incomplete knowledge base with clinical and patient interpretations does not have to be an either/or situation. Furthermore, as clinical decision support systems and PM platforms evolve and ultimately converge, the burden of accessing and interpreting new insights will be facilitated by better artificial intelligence/machine learning (AI/ML) tools and improving interoperability across disparate systems.

## KEY TAKEAWAYS

**PM will catalyze new approaches to using data for quality improvement and biopharma business models as well as financing mechanisms.** PM introduces a range of new data types that will need to be linked to healthcare's diverse pre-existing data sources and outcomes data and will increasingly play a role in drug pricing.

**Computational phenotyping will transform the way that patient cohorts are identified for targeted treatments and, potentially, value-based risk stratification.** PM-derived insights will enable clinicians to identify, stratify, and manage populations more accurately with clinical programs and interventions that better address quality and cost goals.

[1] Ferryman, K, Pitcan, M. What is Precision Medicine. Data Society, 2018.

**Please refer to Table of Contents for complete view of topics covered in the full report.**

# About the Author

**Dr. Jody Ranck** has nearly 30 years of experience working in the global health arena and has helped lead a number of major health technology initiatives throughout his career. Author of two books on digital health, he is a globally recognized thought leader on digital health and has been listed in the "Always On" top 100 minds in Global mHealth (2013). His past clients have included Humana, TM Forum, CLSA, T-Systems, Stanford University's School of Medicine, UC Berkeley, the UN, and ARM to name a few. He has been a frequent advisor to large healthcare companies and startups focused on providing more patient-centric care and transitioning to value-based care. In the past he has been appointed as a member of an Institute of Medicine Committee on ICTs in global health/violence prevention and helped launch a major global eHealth initiative with the Rockefeller Foundation. He has been a frequent keynote speaker at health IT conferences and recently organized and chaired the Healthcare Blockchain Summit (2017-18).

Jody has written and worked extensively on mobile innovations, the Internet of Things (IoT), wearables, blockchain and the analytics market in healthcare. He is also working with cutting edge startups on next generation biosensor platforms, patient generated data for clinical research, and emerging blockchain applications in healthcare. His education includes a Doctorate in Public Health (University of California, Berkeley), MA in International Relations and Economics (Johns Hopkins University) and a BA in Biology (Ithaca College).

# Acronyms Used

| Term | Definition |
|---|---|
| ACG | Adjusted Clinical Groups |
| ACO | Accountable Care Organization |
| AI | Artificial Intelligence |
| AMC | Academic medical center |
| API | Application programming interface |
| BI | Business intelligence |
| CHF | Congestive heart failure |
| CIN | Clinically integrated network |
| CMS | Centers for Medicare and Medicaid Services |
| COPD | Chronic obstructive pulmonary disease |
| CPT | Current Procedural Terminology |
| CQM | Clinical quality metric |
| CVD | Cardiovascular disease |
| DRG | Diagnosis-related group |
| DSRIP | Delivery System Reform Incentive Payment |
| EBM | Evidence-based medicine |
| ED | Emergency department |
| EDW | Enterprise data warehouse |
| EHR | Electronic health record |
| EMR | Electronic medical record |
| ETL | Extract, transform, and load |
| FFS | Fee-for-service |
| FHIR | Fast Healthcare Interoperability Resources |
| HCC | Hierarchical Condition Category |
| HCO | Healthcare organization |
| HEDIS | Healthcare Effectiveness Data and Information Set |
| HHS | Health and Human Services |
| HIE | Health information exchange |
| HIT | Healthcare information technology |
| HL7 | Health Level 7 |
| ICD | International Classification of Disease |
| IDN | Integrated Delivery Network |
| IQR | Inpatient Quality Reporting |
| IRF | Inpatient rehabilitation facility |
| IT | Information technology |
| LTPAC | Long term and post-acute care |
| MA | Medicare Advantage |

| Term | Definition |
|---|---|
| MACRA | Medicare Access and CHIP Reauthorization Act |
| MDS | Long-Term Care Minimum Data Set |
| MIPS | Merit-based Incentive Payment System |
| ML | Machine Learning |
| MSSP | Medicare Shared Savings Program |
| MU | Meaningful use |
| NCQA | National Committee for Quality Assurance |
| NLP | Natural Language Processing |
| NPR | Net patient revenue |
| NQF | National Quality Forum |
| ONC | Office of the National Coordinator |
| OON | Out of network |
| P4P | Pay for performance |
| P4R | Pay for reporting |
| PAC | Post-acute care |
| PBM | Pharmacy benefits manager |
| PCMH | Patient-centered Medical Home |
| PEPM | Per employee per month |
| PM | Precision Medicine |
| PMI | Precision Medicine Initiative |
| PMPM | Per member per month |
| PMPY | Per member per year |
| PPPM | Per provider per month |
| PPS | Performing Provider System |
| PQRS | Physician Quality Reporting System |
| RCM | Revenue cycle management |
| RDBMS | Relational Database Management System |
| REST | Representational state transfer |
| S4S | Sync 4 Science |
| SDoH | Social determinants of health |
| SNF | Skilled nursing facility |
| SNOMED | Systematized Nomenclature of Medicine |
| SQL | Structured query language |
| TJC | The Joint Commission |
| VBC | Value-based care |
| VBP | Value-based Payment |
| VBR | Value-based Reimbursement |

Acronyms Used


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