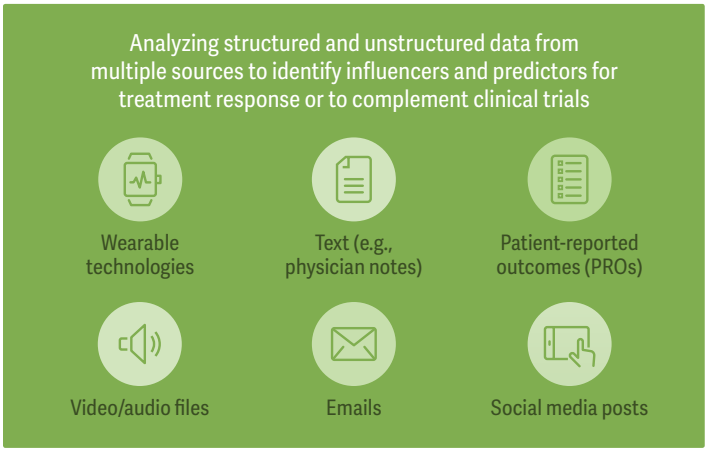
ANALYSIS GROUP ECONOMIC, FINANCIAL and STRATEGY CONSULTANTS

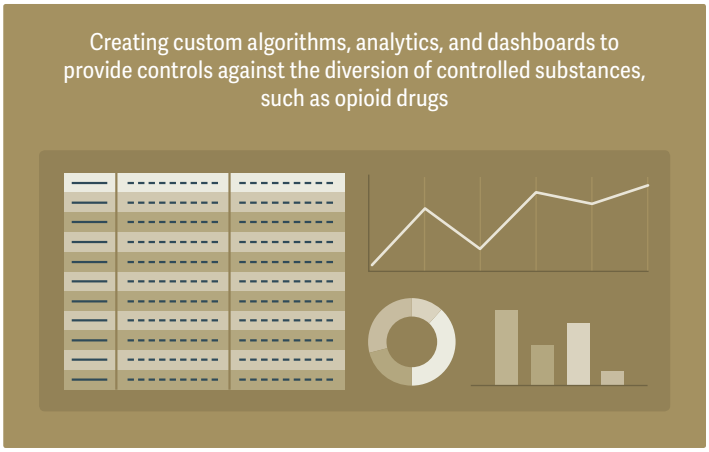
Health Care Bulletin

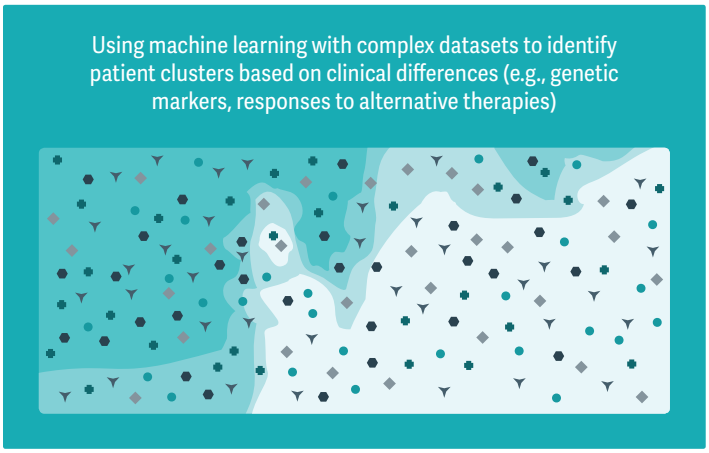
Winter/Spring 2019

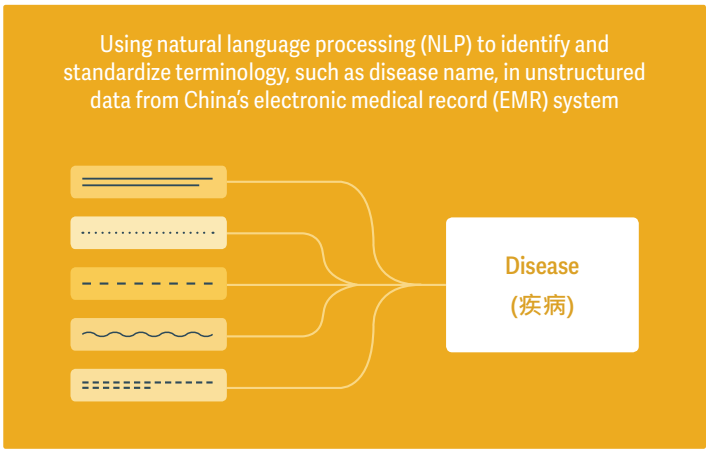
Applying Data Science to Meet Real-World Health Care Challenges

With advanced statistical approaches, health care scientists can extract knowledge from what might otherwise be unmanageable datasets and sources of information.









One of the most pressing challenges businesses face today is how to harness an ever-growing expanse of available information. In the health care field, researchers and decision makers must cope with massive datasets generated from a wide array of new sources in disparate formats. In this context, the tools provided by data science – including machine learning, natural language processing (NLP), voice and imaging recognition, and data visualization – are becoming indispensable for researchers, practitioners, and regulators. Health care data analyses were once confined primarily to whatever information was generated in clinical trials. Now, analyses of real-world datasets (e.g., payer claims, electronic medical record (EMR) (continues on page 2)

Features

Applying Data Science (continued from page 1)

systems, registries) are becoming more commonplace. Researchers also are tapping into data sources that were wholly unimaginable not that long ago. For example, social media posts, emails, and other electronic sources are being analyzed in efforts to detect unforeseen events or previously unidentified conditions. Wearable technology and fitness tracking apps that monitor an individual's health in real time are helping to manage chronic conditions, support disease diagnosis, and improve overall health. Patient-reported outcomes (PROs) are shedding light on the impact of particular interventions on quality of life, with the documentation of physical function, psychological and social well-being, and satisfaction with care. Handwritten physician notes, audio files, and image scans are now finding their way into large-scale data analyses as well. (See graphics on page 1.)

Advances in high-performance computing and flexible data storage undoubtedly are helping to make all this possible, but the advanced methodological approaches offered by data science can be a game-changer. Such techniques provide the ability to rapidly analyze large amounts of information in virtually any format. Take, for example, China's massive unstructured EMR system, where NLP can help researchers identify and standardize terminology across billions of free-text fields – a key first step for many analyses. Advanced statistical techniques also are often important for developing sophisticated algorithms to monitor distribution of controlled substances and flag potential misuse.

In addition, machine learning techniques can be used to improve the accuracy of other common analyses, such as propensity score matching, predicting the risk of developing a disease, and predicting treatment outcomes. They are proving valuable for identifying patterns that are otherwise indiscernible, such as clustering patients by subtle clinical differences.

These are just a few examples of data science in practice. As the volume and types of available data continue to expand across the increasingly complex global "datasphere," researchers will continue to identify new ways to use these tools to answer a wide range of health care questions more efficiently and generate deeper insights. ■

PATRICK LEFEBVRE
MANAGING PRINCIPAL

JIMMY ROYER
PRINCIPAL

Synthesizing Evidence to Secure Coverage and Reimbursement

A key question for payers is whether a drug works as well in the real world as it did in the controlled environment of a clinical trial.

ANITA CHAWLA
MANAGING PRINCIPAL

DAVE NELLESEN
PRINCIPAL

MARCIA REINHART
MANAGER

Before adding a new drug to a health plan formulary and providing reimbursement, payers often require evidence that it is not only safe and efficacious but also effective in the real world. An important way that manufacturers provide this evidence is with formulary dossiers documenting the product and evidence of treatment effect (including comparisons with alternatives); disease characteristics and treatment options; clinical trial results; economic value; and other evidence. A dossier is a single document that ties together all the available data supporting the drug's value.

When available, real-world evidence (RWE) can be an essential part of a compelling evidence package for reimbursement submissions and health technology assessments (HTAs). Results from clinical trials may not be sufficient to support premium pricing because observations from populations that fit often-narrow study inclusion criteria may not be generalizable to health plan members. For example, patients with multiple comorbid conditions may be ineligible for a clinical trial, and patients are often less likely to adhere to prescribed treatment when not closely monitored.

RWE is available from a wide range of sources, including observational studies of data such as patient registries, medical charts or EMRs, administrative claims, and surveys of patients or providers. This evidence can help validate clinical trial results by:

- Demonstrating safety and efficacy in patients with characteristics that were not included in the trial
- Showing safety and efficacy over the long term, beyond the initial measurements made in primary study endpoints
- Showing that patients not treated per a study protocol adhere to the recommended dose and administration schedule and derive the full benefit of treatment
- Matching patient characteristics across different trials to compare whether one intervention is more effective than others in the relevant setting

The value of a new treatment or technology depends on an intervention working as expected in the treated population, and an effective evidence package must be more than the sum of its individual parts. Dossiers synthesizing clinical trial results (which have high internal validity) and real-world studies (which are more generalizable) can convincingly communicate value for a new drug or treatment. ■

> **"[N]ew evidence describing the actual use and effect of the product in a real-world setting should be developed to inform formulary management across the product lifecycle."**
>
> *–THE AMCP FORMAT FOR FORMULARY SUBMISSIONS, VERSION 4.0*

An Expanded Role for Real-World Evidence in FDA Approvals for Drug Registration

RWE is gaining prominence in the drug approval process for promising and breakthrough treatments.

MEI SHENG DUH
MANAGING PRINCIPAL

MARAL DERSARKISSIAN
MANAGER

PRIYANKA BOBBILI
MANAGER

Timeline for Avelumab NDA Accelerated Approval: 3 years

- **IND filing** 3/4/14
- JAN 2015
- **Orphan drug designation** 9/25/15
- **Fast track designation** 10/7/15
- **Breakthrough therapy designation** 11/18/15
- JAN 2016
- **Biologics license application (BLA)** 9/9/16
- **Priority review** 11/29/16
- JAN 2017
- **Accelerated approval** 3/23/17

RWE is clinical evidence derived from real-world data (RWD) – that is, data related to patient health status and/or the delivery of health care that are generated in clinical practice, outside of randomized controlled trials. Pharmaceutical companies have been working with the US Food and Drug Administration (FDA) to explore new ways to use RWE to support new drug applications (NDAs), supplemental new drug applications (sNDAs), and pre-marketing approvals (PMAs) for medical devices. This can be especially important for new therapies that target rare but serious illnesses with unmet need, where single-arm trials are often conducted due to the lack of effective therapies and low feasibility of a parallel-arm controlled trial. In these and other cases, RWE can play a role in complementing and contextualizing a drug's usage, benefits (in terms of efficacy), and risks (in terms of safety) in order to support accelerated approval or in support of confirmatory trials for regular approval after contingency approval is granted.

Bavencio® (avelumab), a drug used to treat Merkel cell carcinoma, a rare and lethal form of skin cancer, provides an example of this in practice. Merck KGaA and Pfizer used RWE from a retrospective observational study to benchmark and contextualize results from their single-arm trial with respect to real-world outcomes in patients treated with chemotherapy. The FDA agreed that the trial efficacy and safety data presented in conjunction with RWE were sufficient to support avelumab's accelerated approval. As a result, avelumab gained accelerated approval only 3 years after its investigational new drug (IND) filing, approximately 1.8 years shorter than the median for other drugs in expedited programs.[1] (See timeline.)

The FDA is continuing to explore approaches and methods for optimizing the use of RWE in its evaluation of NDAs, sNDAs, PMAs, and post-marketing studies. The 21st Century Cures Act, which aims to accelerate the process of bringing new remedies to patients, required the FDA to develop a comprehensive plan for incorporating RWE into regulatory decisions. In December 2018, the agency released a new framework that will "serve as a roadmap for more fully incorporating RWD and RWE into the regulatory paradigm."[2] In addition, it has developed an open-source app, MyStudies, to facilitate patient input of RWD that can be used in support of traditional clinical trials.

Increased use of RWE in the drug approval process necessitates expertise in clinical trials, regulatory epidemiology, health economics and outcomes research (HEOR), and especially observational research methodology. RWE has the potential to both accelerate approval timelines and reduce the costs of drug development, as long as pharmaceutical companies engage in early and ongoing dialogue with the FDA, and are careful to uphold established standards of evidence – including standards for Good Clinical Practice (GCP) and 21 CFR Part 11 requirements. ■

1. HWANG, ET AL., "THE FDA'S EXPEDITED PROGRAMS AND CLINICAL DEVELOPMENT TIMES FOR NOVEL THERAPEUTICS, 2012-2016," *JAMA* 318(21): 2137-2138, 2017.

2. "STATEMENT FROM FDA COMMISSIONER SCOTT GOTTLIEB, M.D., ON FDA'S NEW STRATEGIC FRAMEWORK TO ADVANCE USE OF REAL-WORLD EVIDENCE TO SUPPORT DEVELOPMENT OF DRUGS AND BIOLOGICS," DECEMBER 6, 2018, AVAILABLE AT HTTPS://WWW.FDA.GOV/NEWSEVENTS/NEWSROOM/PRESSANNOUNCEMENTS/UCM627760.HTM.

Recalibrating Predictions of Long-Term Survival Benefits for Novel Cancer Therapies

The development of novel cancer therapies with curative potential has spurred the need for alternatives to traditional survival models for predicting long-term value.

ERIC Q. WU
MANAGING PRINCIPAL

JIPAN XIE
VICE PRESIDENT

HONGBO YANG
VICE PRESIDENT

JENNY ZHOU
VICE PRESIDENT

Statistical modeling techniques are commonly used to predict survival benefits for medical treatments, which is critical for demonstrating a treatment's value for HTA and payers' reimbursement decisions. However, traditional survival models do not accurately capture the complexity of recent novel cancer treatments with new mechanisms of action. A broader range of statistical methods is required to ensure the best fit with the new treatment characteristics in the absence of long-term follow-up data.

For example, clinical trials for a number of emerging cancer therapies – such as immuno-oncology agents and CAR-T therapies – have identified subsets of patients who achieve durable response or remission. When predicting outcomes for these therapies, researchers may find that traditional survival models do not effectively predict the heterogeneous survival trajectories. Relying on traditional methods – such as standard parametric models – may result in biased long-term survival estimation, especially in situations where a significant proportion of individuals can be expected to achieve durable remissions or cure (representing a cohort of long-term "survivors").

To more reliably estimate patient lifespans and quality-adjusted life years (QALY), researchers are increasingly considering alternative modeling methods, such as flexible parametric models, mixture cure models, and landmark-based responder models.

Each model has its pros and cons. (See table.) However, all aim to account for more complex survival trajectories and address the issue of a lack of long-term survival data. The choice of which statistical model should be applied and what inputs should be provided must be carefully considered, as it can significantly affect predictions of long-term value. ■

Key Attributes of Survival Models

	Standard parametric models (e.g., exponential, log-normal)	Flexible parametric models (e.g., piecewise, spline)	Mixture cure models	Landmark-based responder models
Advantages	Well-established for conventional therapies Accepted by most HTAs	Use of multiple polynomial functions allows analysis of divergent responses at inflection points May provide better fit with observed data	Accounts for curative potential of treatments Allows modeling for both "cured" and uncured patients simultaneously	Accounts for heterogeneous responses to treatment at different points in time
Disadvantages	Might not be well-suited for complex and heterogeneous responses with novel treatments	Limited history of use with HTAs Subjective selection of inflection points and functions Extrapolation beyond final segment may not be credible	Limited history of use with HTAs Need to validate underlying assumption of a cure	Limited history of use with HTAs Subjective definition of what constitutes a "response" Subjective selection of landmark points

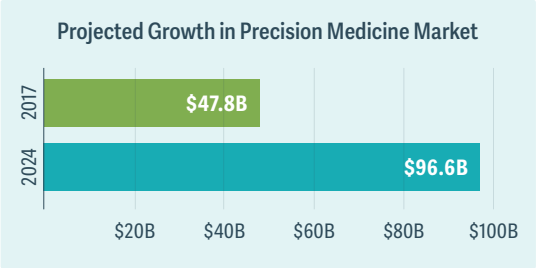
Bringing Precision Medicine to Market

Important breakthroughs have occurred in the area of precision medicine in the past several years.

ANITA CHAWLA
MANAGING PRINCIPAL

ERIC Q. WU
MANAGING PRINCIPAL

Precision medicine tailors the treatment for a disease to the particular patient's genetic makeup, environment, and lifestyle, with the goal of selecting the treatments that are more likely to result in patient benefit compared with a "one size fits all" approach. It is a rapidly growing space with projected valuations of global industry size approaching $100 billion by 2024. (See figure.)



Source: Global Market Insights, *Precision Medicine Market Trends 2018–2024 Industry Growth Forecast* (October 2017)

Recently, Analysis Group supported Foundation Medicine in its request for a National Coverage Determination (NCD) for FoundationOne CDx™, the first comprehensive genomic profiling assay for solid tumors reviewed in parallel by the Centers for Medicare and Medicaid Services (CMS) and the FDA. The final NCD, issued by CMS, allows patients to receive FDA-approved next-generation sequencing (NGS) tests for any recurrent, relapsed, refractory, metastatic, or advanced stage III or IV cancer. These tests can be used to sequence the DNA from tumor tissue, allowing care providers to test for a large number of genomic alterations that are implicated in cancer cell biology. An Analysis Group team supported the request with a comprehensive review and synthesis of medical and scientific information on advanced cancer and care settings in which FoundationOne CDx is expected to be used, the analytic and clinical validity of the test, and the clinical utility of NGS-based testing.

Because targeted treatments are often significantly more expensive than those that are not, payers and national health services are increasingly calling for specific benchmarks for comparative efficacy and cost-effectiveness before including them in coverage policies. This consideration, in turn, raises questions about the definition and measurement of value, as well as the possibility of new payment models. Tools from the fields of economics, epidemiology, biostatistics, and health policy can be jointly deployed to address these questions.

For example, Kymriah® (tisagenlecleucel) is a Novartis treatment for pediatric and young adult patients with relapsed or refractory acute lymphoblastic lymphoma (ALL). Kymriah is a CAR-T therapy, with each treatment made from a patient's own white blood cells. Because the production of each treatment is individualized and only needs to be administered once in a patient's lifetime, value-based pricing is critical. Analysis Group worked with Novartis to construct a cost-effectiveness model for evaluating value-based prices of Kymriah under different willingness-to-pay thresholds. Our model was also adapted to support Novartis's submission to the National Institute for Health and Care Excellence (NICE) in the UK, where Kymriah secured a positive recommendation for reimbursement in ALL. ■

New Payment Strategies for Gene Therapy

To realize the clinical benefits of gene therapy, "outside the box" payment models may be needed.

As clinically transformative gene therapies advance, payers are considering the potential economic impacts and their likely coverage and reimbursement responses. Though the probability of having an eligible patient may be low, upfront payments may be high. In addition, there may be uncertainty about long-term clinical effects, and the possibility of patients switching insurers.

Several alternative payment strategies have been proposed to help mitigate these concerns and address potential access barriers. These include long-term financing agreements that smooth payments over time, and performance agreements that link payments to certain clinical milestones. But are payers prepared to adopt these new mechanisms, or will they instead rely on existing strategies – or simply exclude gene therapy from coverage altogether?

To answer this question, an Analysis Group team worked with researchers from the National Pharmaceutical Council to conduct an online survey of payers about the roles that existing and new alternative payment approaches could play in managing the financial risk of gene therapies. Respondents included pharmacy directors from 21 national and regional managed care organizations covering 123 million lives in the US. Among our findings were:

- Payers would consider alternative payment models to manage plan risk under the right circumstances. All of the national plans and half of the regional plans said they were somewhat or highly likely to enter into at least one alternative payment arrangement for gene therapy within the next three years.
- Given uncertainty about the magnitude and duration of clinical effects, payers will likely require performance guarantees with alternative payment approaches. Some 95% of respondents said that paying for patients who are no longer responding to therapy would be a major barrier.
- Payers expected to use a combination of new and existing approaches to manage gene therapy, but recognized they may face challenges in combining traditional and alternative approaches. In addition, many payers were uncomfortable with "patient portability" proposals, where a long-term payment obligation followed the patient from payer to payer.
- The greatest patient access challenges may be encountered at smaller employer plans and managed Medicaid plans. Nearly a third of such plans indicated that they were likely to exclude coverage for gene therapies. ■

GENIA LONG
SENIOR ADVISOR

NOAM KIRSON
MANAGING PRINCIPAL

MICHAELA JOHNSON
ASSOCIATE

ADAPTED FROM "ARE PAYERS READY TO ADDRESS THE FINANCIAL CHALLENGES ASSOCIATED WITH GENE THERAPY?" PUBLISHED IN *HEALTH AFFAIRS BLOG*, JUNE 28, 2018

> **"The stakes are high. How we pay for gene therapy will be a measure of how prepared we are to deal with the next generation of innovative treatments."**
>
> –**GENIA LONG**, QUOTED IN *FORBES*, AUG. 31, 2018

Affiliate Spotlight

Analysis Group is pleased to highlight two new academic affiliates whose credentials in life sciences augment our core strengths.

CRAIG GARTHWAITE

Herman R. Smith Research Professor in Hospital and Health Services Management and Director of Healthcare, Kellogg School of Management at Northwestern University

Professor Garthwaite is an applied microeconomist who studies the effects of government policies and social phenomena, particularly in the areas of health and biopharmaceuticals. His recent work focuses on the private sector effects of the Affordable Care Act, including the labor supply effects of large insurance expansions, the changes in uncompensated hospital care resulting from public insurance expansions, and the responses of nonprofit hospitals to financial shocks. Professor Garthwaite also studies biopharmaceutical pricing and innovation, including the effect of expanded patent protection on pricing in the Indian pharmaceutical market, the effects of increases in demand on innovation by US pharmaceutical firms, and the relationship between health insurance expansions and high drug prices. Additionally, he studies the effects of the increased use of private firms to operate and manage social insurance programs, with a focus on Medicaid managed-care firms. Professor Garthwaite has testified before the US House of Representatives and several state legislatures on the minimum wage, health care reforms, and consolidation in health care markets. He has also held several public policy positions, including faculty associate with Northwestern University's Institute for Policy Research and director of research for the Employment Policies Institute. Professor Garthwaite's research has appeared in journals such as *The Quarterly Journal of Economics*, *American Economic Review*, *The Review of Economics and Statistics*, and *Health Affairs*; and has been profiled in media outlets such as *The New York Times*, *The Wall Street Journal*, *The Washington Post*, and *Vox*. He has also appeared on various TV and radio programs, including *Nightly Business Report* and *Marketplace*. ■

ANUPAM B. JENA

Ruth L. Newhouse Associate Professor of Health Care Policy, Harvard Medical School; Physician, Department of Medicine, Massachusetts General Hospital

Professor Jena is a health economist, practicing internal medicine physician, and professor of health care policy. His work involves several areas of health economics and policy, including the economics of medical innovation, the economics of physician behavior and the physician workforce, medical malpractice, and the economics of health care productivity. Professor Jena has been retained as an expert in several pharmaceutical and health care industry matters. A prolific author, Professor Jena has contributed to more than 150 peer-reviewed articles and articles intended to increase patient understanding, published in outlets including *The New England Journal of Medicine* and *The New York Times*. He is a faculty research fellow at the National Bureau of Economic Research and serves on Harvard Medical School's Standing Committee on Health Policy. Professor Jena is a recipient of the NIH Director's Early Independence Award to fund research on the physician determinants of health care spending, quality, and patient outcomes, and a recipient of the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) New Investigator Award. In 2018, he was listed among 100 great leaders in health care by *Becker's Hospital Review*. ■

Videos: A Diverse Health Care Practice

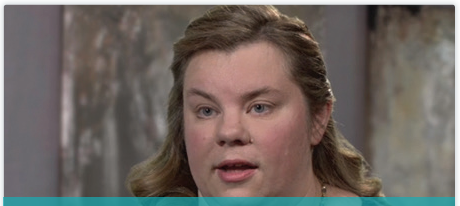
When clients are facing challenges with a health care component, they count on Analysis Group's unique ability to build a diverse team to address every aspect of the question at hand. Drawing on our Health Care group's expertise, we provide assistance with matters related to HEOR; epidemiology and drug safety; market access, pricing/contracting, and commercial strategy; litigation; and public policy assessments.

To view these videos, please visit: **www.analysisgroup.com/health-care-videos**

Health Care Practice Overview

PAUL GREENBERG

The director of the Health Care practice discusses the breadth of our health care work, what distinguishes our practice from others, and the unique value that we provide to clients.



Using Data in Suspicious Order Monitoring of Opioids

CRYSTAL PIKE & KENNETH WEINSTEIN

New and advanced Suspicious Order Monitoring (SOM) algorithms are helping distinguish between legitimate and illegitimate orders of controlled substances.

Patient-Reported Outcomes

ERIC Q. WU & MIN YANG

In pharmaceutical approvals, regulatory agencies are increasingly incorporating PROs into clinical assessments.

Balancing Drug Pricing with Value

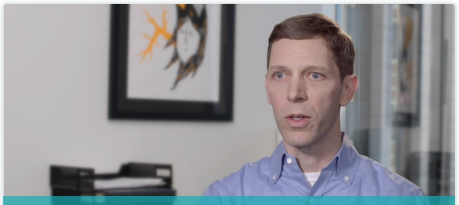
NOAM KIRSON

A too-narrow focus on the rising cost of prescription drugs fails to capture how innovative therapies may offer value relative to existing therapies.

Using Machine Learning in Economic Consulting

LISA PINHEIRO & JIMMY ROYER

Harnessing the power of artificial intelligence to analyze big data, Analysis Group is finding new ways to solve our clients' complex intellectual property (IP), health care, and antitrust problems.



The Competitive Landscape for Biosimilars

RICHARD MORTIMER

While IP and antitrust litigation involving pharmaceuticals has been widespread in the US, the emergence of biosimilar drugs has raised questions around how this litigation will evolve.

Asia Spotlight: Beijing Forum

Analysis Group helped organize a conference with more than 100 government officials, academics, and industry stakeholders from around the world to discuss medical big data, health economics, and HTA research.

Participants included (from top): Managing Principal Eric Q. Wu, Analysis Group; Director of China Simeng Han, Analysis Group; Professor Gordon Liu, Peking University; and Professor Jing Wu, Tianjin University.

Presenters at the Forum, which took place in 2018 in Beijing, included leading academics from some of the foremost universities and medical institutions in China, the US, and the UK, as well as senior officials from government organizations. The conference was organized jointly by the Medical Big Data Center (an entity formed by Tsinghua University's Center for Statistical Science and Analysis Group) and Fudan University's Health Technology Assessment Center.

The Forum was chaired by Professor Ke Deng, Deputy Director of the Center for Statistical Science at Tsinghua University. Professor Xihong Lin, Head of Harvard University's Department of Biostatistics and Co-director of the Center of Statistical Science at Tsinghua University, delivered opening remarks. In an academic session focused on the current status and prospects of, and international cooperation related to, HTAs in China, discussion topics included the reform of the medical insurance access system in China; techniques for identifying optimal target populations; the current status of HTAs in China; and HTA collaboration between China and Britain. In a session focused on the technological frontier of medical big data research, presenters discussed the prospect of combining EMRs with genomic data, the application of big data technology in medical practice, and innovation in personal medical data sharing.

The Forum also featured a roundtable discussion with several experts about the challenges of incorporating HEOR results into medical insurance reimbursement, improving research quality, and strengthening the cooperation between China and the US with respect to HTAs. Closing remarks were presented by Professor Yingyao Chen, Vice Dean of Fudan University's School of Public Health and Director of the Key Laboratory of Health Technology Assessment (National Health and Family Planning Commission). ■

Selected speakers from the Beijing Forum

Current status, prospects, and international cooperation related to HTAs in China

Xianjun Xiong (Keynote)
Secretary, Social Insurance Management Center, China Ministry of Human Resources and Social Security

Gordon Liu (Keynote)
Director, China Center for Health Economics Research, Peking University National School of Development; Affiliate, Analysis Group

Eric Q. Wu
Managing Principal, Analysis Group

Praveen Thokala
Research Fellow, University of Sheffield

The technological frontier of medical big data research

Wing Hung Wong
Professor in Science and Human Health, Professor of Statistics, and Professor of Biomedical Data Science, Stanford University

Shan Wang
Professor of Surgery, Peking University People's Hospital

Simeng Han
Director of China, Analysis Group

Hui Xiao
Chief Application Officer, CEC DATA Systems

Roundtable discussion on HEOR challenges

Jing Wu (Discussion Leader)
Professor of School of Pharmaceutical Science and Technology, Tianjin University

Analysis Group at 2018 Conferences

Analysis Group contributed to the following major conferences through participation in symposiums and panels, poster presentations, and sponsorships.

ISPOR Europe

November 2018

- Educational Symposium: "Advances in HEOR: New Frontiers Based on Developments in Artificial Intelligence" (Managing Principal Eric Q. Wu and Principal Jimmy Royer)
- Podium Presentation: "Ambulatory Function in Duchenne Muscular Dystrophy (DMD): The Characteristic Trajectory and Variation Across Individuals" (Managing Principal James Signorovitch)

ISPOR Asia Pacific

September 2018

- Symposium: "Challenges and Opportunities in Health Technology Assessment in China" (Managing Principal Eric Q. Wu)

34th International Conference on Pharmacoepidemiology & Therapeutic Risk Management (ICPE)

August 2018

- Spotlight Session: "Mediation by Patient-Reported Outcomes of the Association Between Film-Coated or Dispersible Formulations of Deferasirox and Serum Ferritin Reduction: A Post Hoc Analysis of the ECLIPSE Trial" (Managing Principal Mei Sheng Duh and Managers Priyanka Bobbili and Wendy Cheng)

Alzheimer's Association International Conference 2018

July 2018

- Poster Presentation: "Do the Minimal Clinically Important Difference Estimates for Clinical Outcome Assessments for Alzheimer's Disease Differ by Disease Severity?" (Managing Principal Noam Kirson and Manager Urvi Desai)

Seventh Conference of the American Society of Health Economists (ASHEcon)

June 2018

- Presentation: "Have You Considered Being an Expert Witness?" (Managing Principal Crystal Pike, Vice President Brad Rice, and Associates Phil Hall-Partyka and Amanda Nguyen)

ISPOR Boston Chapter

May 2018

- Presentation: "Insurance Switching and Mismatch Between the Costs and Benefits of New Technologies" (Managing Principal Noam Kirson)

ISPOR 2018

May 2018

- Educational Symposium: "Advancements in Methods of Survival Benefit Estimation for Novel Oncology Drugs and their Applications in ICER Reviews" (Managing Principal Eric Q. Wu and Vice President Jenny Zhou)
- Workshop: "Estimating the Cost of Adverse Events in Economic Models" (Vice President Martin Cloutier)
- Issue Panel: "Surrogate Outcomes in Oncology" (Vice President Jipan Xie)
- Podium Presentation: "Real-World Analysis of Treatment Patterns and Long-Term Effectiveness Among Patients with Advanced Neuroendocrine Tumors of Lung Origin – A Multicenter Study" (Manager Lynn Huynh)
- Research Poster Presentation Award Semifinalist: "Patterns of Treatment and Recurrence in Patients with Non-Metastatic Melanoma who Underwent Lymph Node Dissection Survey" (Managing Principal Mei Sheng Duh, Vice President François Laliberté, Manager Raluca Ionescu-Ittu, and Associate Ameur Manceur)

AMCP Managed Care & Specialty Pharma Annual Meeting 2018

April 2018

- Silver Ribbon Poster: "Budget Impact Model of Aliqopa (copanlisib) Introduction in Relapsed Follicular Lymphoma Treatment" (Managing Principal Mei Sheng Duh and Associates Rachel Bhak and Miriam Ellis)
- Bronze Ribbon Poster: "A Comparison of Antipsychotic Treatment Patterns, Healthcare Resource Utilization, and Associated Costs in Veterans with Schizophrenia Pre- and Post-Initiation of Treatment with Once-Every-Three-Month Paliperidone Palmitate" (Managing Principal Patrick Lefebvre, Vice President Marie-Hélène Lafeuille, Managers Priyanka Bobbili and Maral DerSarkissian, and Associate Rachel Bhak)

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Health Care Bulletin

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