



AVALON HEALTH ECONOMICS

Avalon Health Economics HEOR Capabilities

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Company Overview

- Avalon Health Economics LLC (“AHE”) was formed by a group of experienced academic and industry health economists and associates, bringing together several existing consulting practices.
- The company’s origins were in the Health Economics Consulting Group LLC, which started in 2004 and merged with Oxford Outcomes in 2009.
- All three AHE Principals– John Schneider, Cara Scheibling, and Andrew Briggs, worked together as part of Oxford Outcomes from 2009-2013. AHE Scientific Advisor Mark Sculpher was also part of the Oxford team. Thus, the core of AHE has a long and productive work history together.
- We provide high-quality, high-value real-world health economics consulting and research services relying on unparalleled industry knowledge and experience, accurate and defensible research, and attentive project management.



Company Overview: Leadership

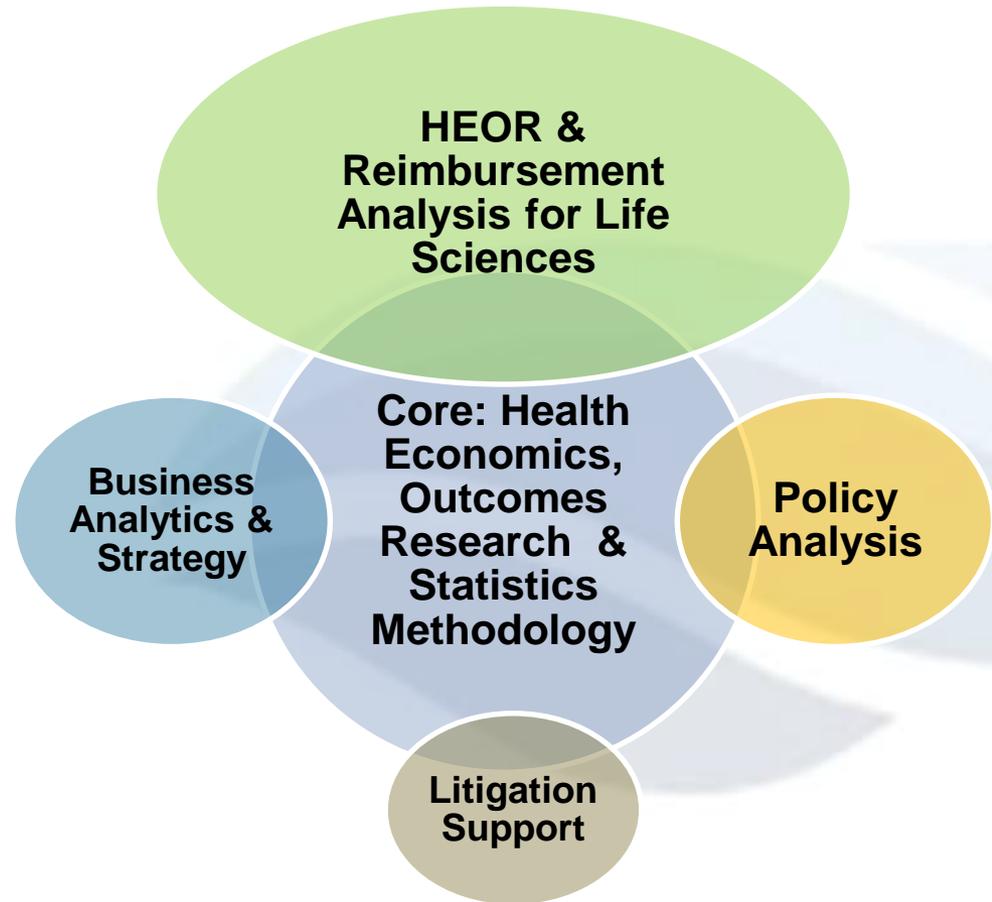
- Led by CEO **John Schneider, PhD**, Director and Principal **Andrew Briggs, DPhil**, Director **Robert Ohsfeldt, PhD**, and Scientific Advisor **Mark Sculpher, PhD**, AHE researchers and consultants have extensive knowledge and experience in the field of health economics and outcomes research (HEOR), from an academic and industry perspective.
- Avalon CEO **John Schneider, PhD** has more than 25 years of experience in HEOR in pharmaceuticals and medical devices, and has lead the development of HEOR teams at the Health Economics Consulting Group (HECG), Oxford Outcomes (US operations), ICON plc., and Avalon Health Economics.
- Our HEOR division is also supported by leadership from Director **James Robinson, PhD** and Medical Director **Philipp Schuetz, MD, MPH**.
- Leadership is backed by a highly-trained support staff



Avalon Scope of Services

Our main focus is Health Economics and Outcomes Research (HEOR) for medical device and pharmaceutical industry clients, but we also provide related services in policy analysis, litigation support, and business analytics & strategy.

The “core” linking these activities is our strong base in HEOR methodology, statistics, and data analysis, and our proven track record in communicating research in the form of reports and published peer-reviewed articles



Core Team

Core Leadership

John Schneider, PhD
Cara Scheibling
Andrew Briggs, DPhil
James Robinson, PhD
Mark Sculpher, PhD
Robert Ohsfeldt, PhD



Key Supporting Staff

Ivana Stojanovic, MA
Anjani Parikh, MPH
Noemi Kiss, MSc
Katherine Dick
Nicole Nelson



- We have **10** core experienced staff dedicated to leadership, project management, and analysis.
- In addition, we are backed by panel of another **10** experienced economists, statisticians, and consultants with extensive industry and academic experience in outcomes research, health care, medicine, epidemiology, statistics, economics, business, and law, serving as **Senior Consultants** to our core team



Focus on Avalon HEOR Leadership



John Schneider, PhD – Leader in applied HEOR and building of HEOR analytic teams. Co-author (with Avalon Director Robert Ohsfeldt) of the book “The Business of Health”



Andrew Briggs, DPhil- Leader in HEOR methodology & HTA, leader within ISPOR. Co-author of the popular HEOR book “Decision Modelling for Health Economic Evaluation”



James Robinson, PhD- Leader in US health economics & HEOR & US payer coverage decisions. Author of the book “Purchasing Medical Innovation: The Right Technology, for the Right Patient, at the Right Price”



Robert Ohsfeldt, PhD- Leader in US health services research, HEOR, and real-world data analysis. Co-author (with Avalon CEO John Schneider) of the book “The Business of Health”



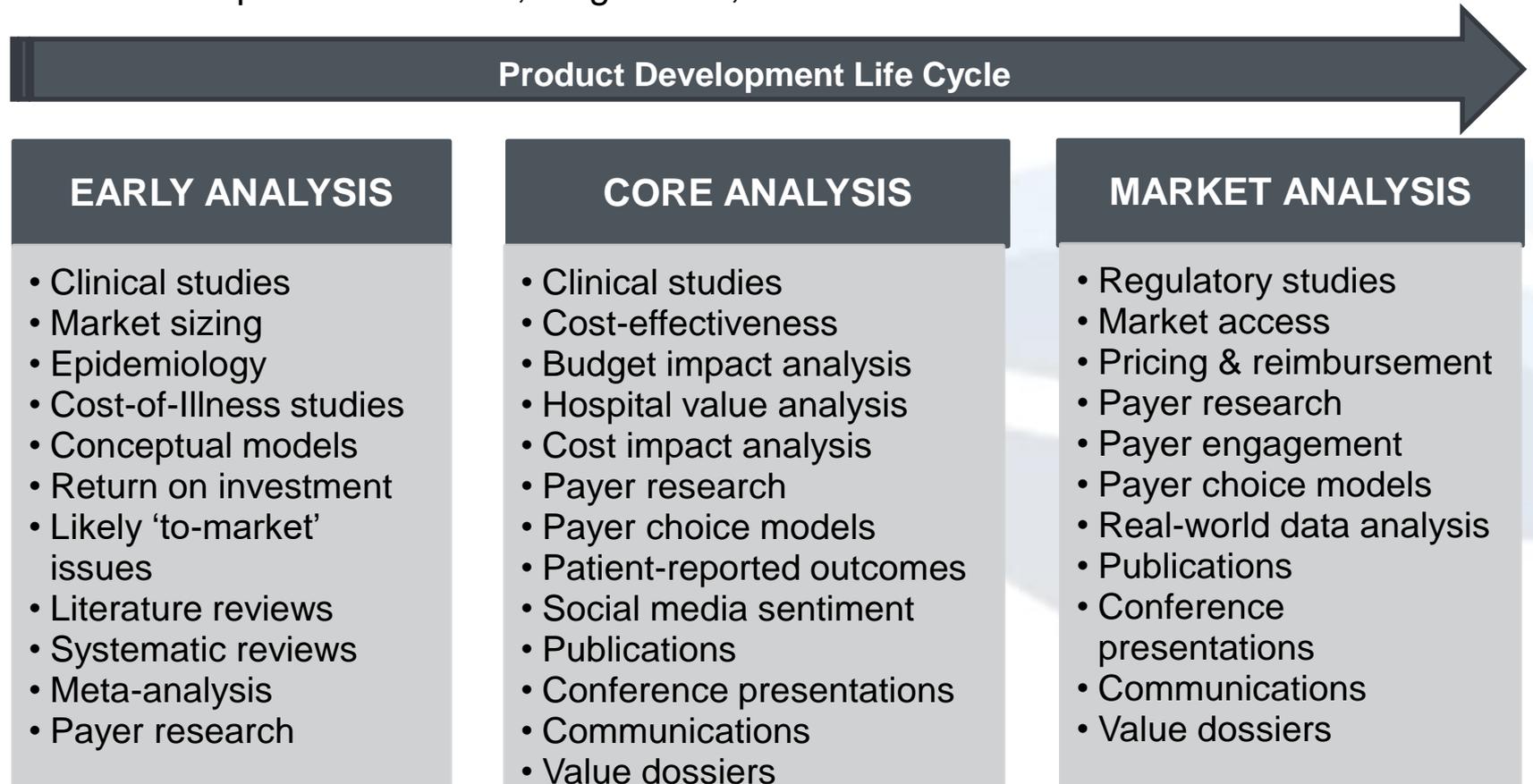
Avalon Team Profile: Andrew Briggs, DPhil

- **Andrew Briggs, DPhil.** In addition to his leadership role as Director at Avalon, Andrew holds the William R Lindsay Chair in Health Economics at the University of Glasgow and is Visiting Scholar at Memorial Sloan Kettering Cancer Center in New York City.
 - Andrew has expertise in all areas of health economic evaluation. He has published well over 200 articles in the peer-reviewed literature. He has particularly focused on statistical methods for cost-effectiveness analysis. This includes statistical methods for estimation of parameters for cost-effectiveness models as well as statistical analysis of cost-effectiveness alongside clinical trials. He also has a more general interest in epidemiological methods, in particular the use of prognostic scoring methods for predicting health outcomes and the relationship with heterogeneity in cost-effectiveness.
 - Andrew recently took a leadership role as co-chair of the Joint Society for Medical Decision Making (SMDM) and International Society for Pharmacoeconomics and Outcomes Research (ISPOR) Task Force on Modelling Methods. He is also the author of two successful textbooks, one published by OUP entitled Decision Modelling for Health Economic Evaluation, and another published by Wiley entitled Statistical Methods for Cost-Effectiveness Analysis. He also serves as Editor of the journal Health Economics, and is on the editorial board of Value in Health.



Capabilities: Avalon Scope of Services Along the Product Development Lifecycle

Avalon’s services include a wide variety of offerings across the product development continuum in pharmaceuticals, diagnostics, and medical devices.



Types of Clients & Engagements

Pharmaceuticals

- Examples include Eli Lilly, Genentech, Meda, Amgen, Pfizer, Merck, Novartis, Helsinn, GSK, BMS, Astra Zeneca, Boehringer Ingelheim, Vertex, Tesaro, and Acucela.
- We have also worked with a number of smaller biotechnology companies.

Rx

Project planning, systematic reviews, meta-analyses, conceptual models, building CEA into trials

Cost-effectiveness models, budget impact models, HTA submissions, value dossiers, communication tools, publications

Medical Devices & Diagnostics

- Examples include Abbott Diagnostics, Teleflex, Terumo, Olympus, Medtronic, CVRx, Hygieia, Checkpoint Surgical, and Boston Scientific.
- We have also worked with the Coulter Foundation on early-stage development of novel devices

Dx

Project planning, systematic or comprehensive reviews, meta-analysis, study design

Cost-effectiveness analysis, hospital value analysis, cost-impact modelling, communication tools, publications



Engagement & Project Management

Philosophy

- We provide high-quality, high-value real-world health care economics consulting and research services relying on unparalleled industry knowledge and experience, accurate and defensible research, and attentive project management
- We are large enough to handle complex projects, but small enough to quickly and efficiently deliver tailored solutions
- We work on projects of all size and scale

Project Management

- Project Director has ultimate responsibility for the forward progress of the project
- Project Manager assumes day-to-day responsibility of task progress.
- Unlike some of the larger health economics and outcomes research vendors, our senior staff members (including Project Directors and Senior Consultants) are materially and regularly involved with all projects



What Makes Avalon Different?

Four ways in which Avalon differs, and will always differ, from other HEOR vendors:

1. Academic and methodological strength. Our Principals and Directors have deep knowledge and experience in the academic side of economic valuation. Academic rigor is increasingly important as payers and purchasers raise their standards and expectations for economic evidence
2. Again, unlike some of the larger HEOR vendors, our senior staff members (including Project Directors and Senior Consultants) are materially and regularly involved with all projects.
3. We are small and will remain small. Our Principals & staff have worked at larger firms, and we understand some of the problems associated with “big box” vendors. Avalon is a small “boutique” firm, with exceptionally experienced & qualified leaders who want to be involved in the work.
4. Avalon steadfastly focuses on three simple management & operational principles:
 - **Pay attention** to the client and their needs;
 - **Keep it simple**; more complex solutions are not always the ones that deliver the most value to our clients;
 - **Focus on the audience**—developing “cookie cutter” approaches to value stories is not always the best approach



Approach to Client Engagements

Regardless of the specific aim of each engagement, our approach consistently follows a four basic principles:

CONTEXT: Develop a clear understanding of how project fits within overall product development, launch & market-building strategies

LOGIC: Develop a simple conceptual model of the problem the project is addressing, and use the conceptual model to drive research & modelling strategy & demonstrate model feasibility

VALUE-ADDED: Create deliverables that address the main goals of the project, but creatively differentiate these deliverables leveraging the depth of experience of Avalon's leadership

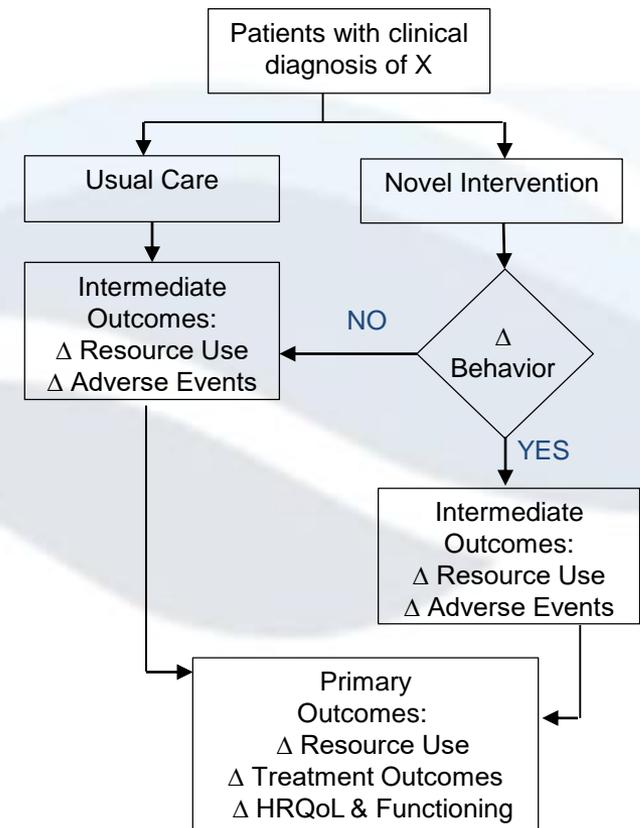
COMMUNICATIONS: The value of all projects are enhanced by a clear & productive communication strategy designed to optimally translate research findings to the right audiences



Note on the Value of Logic & Conceptual Models

Conceptual frameworks encourage focus on the important parts of the problem and the driving logic

- Conceptual models are rigorous enough to guide discussion (and in some cases to be published) but rely on literature, plausible assumptions, reasonable data ranges, and expert opinion
- Conceptual models are advantageous for:
 - Early-stage analysis with little data;
 - Mid-stage analysis with minimal data;
 - Late-stage analysis with good data but unusual clinical applications (e.g., rare diseases, long benefit time horizons, or mixed perspectives)



Our Approach to Data

We have extensive experience working with a wide variety of data sources. We apply these data quality hierarchies to assure the best data are used

Clinical Data

- Randomized controlled trials
- Retrospective and prospective observational studies & cohort studies*
- Case-controlled studies (instrumental variables; propensity-score matching)*
- Small-sample studies, case studies, & qualitative research*
- Systematic literature reviews (SLRs) & meta-analyses
- Social media sentiment*

Cost Data

- CEA alongside clinical trials (Director Andy Briggs has extensive experience in these applications)
- Claims data (US: private or Medicare; x-US: administrative databases)
- Point estimates from literature (preferably gathered via SLRs followed by meta-analysis)
- Public data sets (e.g., HCUP or MEPS in US)
- Expert opinion or patient-reported

*Includes *de novo* collection or retrospective database (e.g., claims, registry) analysis



Areas of Specific Expertise

Avalon has experience across most therapeutic areas, and has conducted a wide variety of studies of pharmaceuticals and medical devices

Pharmaceuticals

- Extensive experience across a wide range of therapeutic areas, including oncology, diabetes, COPD, CHF, cardiology, orthopedics, rare and orphan diseases, ophthalmology, dermatology, asthma, respiratory infections, infectious diseases, gastroenterology, and many others.
- Extensive participation in ISPOR methodology workgroups (e.g., Task Force on Modelling Methods)
- Extensive participation on HTA panels and Advisory Boards

Medical Devices & Diagnostics

- Avalon has developed specific expertise in the economics of diagnostics, and has been regularly teaching the course “The Economics of Diagnostics” at the annual ISPOR meetings
- Development of cost-impact and hospital value models for presentation to health system supply chain purchasers
- Design of health economics elements in clinical studies
- Payer research



Offices, Market Coverage, & Contact Information

United States

- **New Jersey:** Our main offices are located in Morristown, NJ (26 Washington St.), within a one-hour train ride from New York City. We are located in the heart of New Jersey's vibrant pharmaceutical and medical device industry, and within easy reach of the lively life science industries in neighboring New York, Pennsylvania & Connecticut.
- **Other US Locations:** Avalon Director James Robinson is based in San Francisco & Berkeley, CA, and offers west-coast capabilities. Avalon Director Robert Ohsfeldt is based in College Station, TX, and offers capabilities in the south and Midwest.

Outside of U.S.

- **Europe:** Avalon Director Andrew Briggs and Scientific Advisor Mark Sculpher provide deep experience in UK HTA and HTA in other European countries. Avalon Clinical Director Philipp Schuetz is located in Basel, Switzerland, and Health Economist Noemi Kiss is located in Vienna, Austria.
- **Global:** Other Avalon associates and Senior Consultants are located in China, Chile, & GCC countries.

Main contact information for all inquiries:

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