The National Academies of
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INSTITUTE OF MEDICINE

Board on Health Sciences Policy
Forum on Drug Discovery, Development, and Translation

Advancing the Discipline of Regulatory Science for Medical Product Development: An Update on Progress and a Forward-Looking Agenda An IOM Workshop

October 20–21, 2015

Keck Center
500 5th Street, NW Room 100
Washington, DC 20001

Background and Workshop Objectives:

The Food and Drug Administration (FDA) defines regulatory science as the science of developing new tools, standards, and approaches to assess the safety, effectiveness, quality, toxicity, public health impact, or performance of FDA regulated products. Since its inception, the IOM's Forum on Drug Discovery, Development, and Translation has focused on the need for strengthening the scientific basis of drug regulation. In February 2010, the Forum held a workshop, *Building a National Framework for the Establishment of Regulatory Science for Drug Development*, that examined the state of the science of drug regulation and considered approaches to enhance regulatory science. In September 2011, the Forum held another workshop, *Strengthening a Workforce for Innovative Regulatory Science in Therapeutics Development*, that considered opportunities and needs for advancing innovative regulatory science through workforce and career development. Over the past several years, models to support the discipline have advanced. FDA's *Centers of Excellence in Regulatory Science and Innovation* enhance training and educational opportunities for regulatory scientists. Private funders have also established programs: for example, in 2011 the Burroughs Wellcome Fund launched Innovations in Regulatory Science Awards (IRSA), which aim to strengthen regulatory systems capacity by funding regulatory science-based research and collaborations.

This workshop will provide a venue to review progress in building the foundations of regulatory science and to explore a forward-looking agenda for bolstering the field. Participants will examine the current state and scope of the discipline, highlight opportunities to address barriers to success, and explore ways to foster collaboration. The workshop objectives are to:

- Explore current regulatory science priorities and strategies in federal, academic, and private sector settings.
- Consider the current state of regulatory science as a discipline.
  - Discuss professional training successes.
  - Highlight opportunities to further support training, workforce, and career development.
- Explore the core components of a robust discipline of innovative regulatory science.
  - Consider gaps and key opportunities to address needs to support the discipline of innovative regulatory science.
- Examine needs and barriers to collaboration among, across, and within the public and private sectors.

Day One

8:00 a.m. Breakfast Available

8:30 a.m. Opening Remarks

MARTIN PHILBERT, *Workshop Co-Chair*
Professor and Dean
University of Michigan School of Public Health

ALASTAIR WOOD, *Workshop Co-Chair*
Partner, Symphony Capital
Professor of Medicine and Pharmacology, Weill Cornell School of Medicine

SESSION I: SETTING THE STAGE FOR INNOVATION IN REGULATORY SCIENCE

Session Objectives:

- Introduce and discuss workshop theme.
- Highlight key scientific questions for the field of innovative regulatory science, focusing on the role of information as it is generated across regulatory science domains and ways that it can be better put to use.
- Discuss how new capabilities and access to new information could advance regulatory science for medical product development.
- Highlight operational challenges.

8:40 a.m. Background and Session Objectives

Session Chair: Alastair Wood, Partner, Symphony Capital, Professor of Medicine and Pharmacology, Weill Cornell School of Medicine (*Workshop Co-Chair*)

8:45 a.m. **Workshop Theme and Framework:**
Innovation in Regulatory Science Through Integration of Information

Transformation of Our Ability to Generate, Analyze, Integrate and Share Information Across Regulatory Science Applications

RUSS ALTMAN
The Kenneth Fong Professor of Bioengineering, Genetics, Medicine & (by courtesy) Computer Science
Stanford University

9:00 a.m. *Role of New Sources of Information and Information Sciences in Regulatory Science*

JIM STEVENS
Distinguished Research Fellow
Eli Lilly

9:15 a.m. *Value of Information to Inform Decision Making Under Uncertainty*

KATHERINE VON STACKELBERG
Research Scientist
Harvard Center for Risk Analysis

9:30 a.m. *Fusing Randomization With EHR 'Big Data' For Smarter Evidence Generation On Approved Medical Products*

DEREK ANGUS
Distinguished Professor and Mitchell P. Fink Endowed Chair, Department of Critical Care Medicine
University of Pittsburgh

9:45 a.m. **Panel Discussion and Audience Q&A** (*30 mins*)

10:15 a.m. **BREAK** (*15 mins*)

SESSION II: LEARNING LESSONS THROUGH CONSIDERATION OF REGULATORY SCIENCE APPLICATIONS

Session Objectives:

- Discuss how enhanced approaches to obtaining, accessing, and integrating information could advance the science throughout and across development.
- Through consideration of selected regulatory science applications, discuss current capabilities for regulatory science and strategic priorities in federal, academic, and private sectors.
- Suggest ways forward to address identified gaps and operational challenges.

10:30 a.m. Background and Session Objectives

Session Chair: Stephen Ostroff, Acting Commissioner, U.S. Food and Drug Administration

10:35 a.m. **Identifying and Developing Meaningful Biomarkers**

Panel Moderator: John Wagner, Senior Vice President, Head of Clinical and Translational Sciences, Takeda Pharmaceuticals

10:40 a.m. *Basic Science of Measurement: Metrology Principles for Biomarkers*

MARC SALIT
Leader, Genome-Scale Measurements
National Institute of Standards and Technology (NIST)

10:50 a.m. *Opportunities to Develop Meaningful Biomarkers: Polycystic Kidney Disease Biomarker Qualification*

SHASHI AMUR
Scientific Lead, CDER's Biomarker Qualification Program
U.S. Food and Drug Administration

11:00 a.m *Challenges and Opportunities for Qualifying Biomarkers: An Industry Perspective*

GABRIELA LAVEZZARI
Assistant VP, Science & Regulatory Advocacy
Pharmaceutical Research and Manufacturers of America (P*h*RMA)

11:10 a.m. *Collaborative Approaches for Developing Kidney Safety Biomarkers*

JOHN MICHAEL SAUER
Executive Director, Predictive Safety Testing Consortium (PSTC)
The Critical Path Institute

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11:20 a.m. **Panel Discussion and Audience Q&A** (*30 mins*)

11:50 p.m. **BREAK to Lunch** (*60 mins*)

SESSION II, CONT'D: CONSIDERATION OF REGULATORY SCIENCE APPLICATIONS

12:50 p.m. **Clinical Trial Data Integration**

Panel Moderator: Rob Califf, Deputy Commissioner for Medical Products and Tobacco, U.S. Food and Drug Administration

12:55 p.m. *Developing Capabilities to Integrate and Use Data from Very Large Data Sets*

MARTIN LANDRAY
Professor of Medicine and Epidemiology, Deputy Director Big Data Institute
University of Oxford

1:05 p.m. *Approaches to Overcoming Variance Due to Heterogeneity in Rare Disease*

SUSAN WARD
Founder and Executive Director
The TAP Collaboration

1:15 p.m. *Access To Patient Level Data From Clinical Trials*

PERRY NISEN
Chief Executive Officer
Sanford Burnham

1:25 p.m. *The Role of Open APIs (Application Programming Interface) and the FHIR (Fast Healthcare Interoperability Resources) Platform for Enabling The Integration of Research and Clinical Care Data*

CHARLES JAFFE
Chief Executive Officer
Health Level Seven International

1:35 p.m. *Data Aggregation Across Diseases and Between Stakeholders*

ENRIQUE AVILES
Director of Data Standards, Management, and Technology
The Critical Path Institute

1:45 p.m. **Panel Discussion and Audience Q&A** (*30 mins*)

Panelists:

- *Clinical Trial Data Integration* speakers (above), and
- Kyle J. Myers, Director, Division of Imaging, Diagnostics, and Software Reliability (DIDSR), U.S. Food and Drug Administration

2:15 p.m. **BREAK** (*15 mins*)

2:30 p.m. **Next Generation Surveillance**

Panel Moderator: Brian Strom, Chancellor of Rutgers Biomedical and Health Sciences, Rutgers, the State University of New Jersey

2:35 p.m. *Integrating Systems and Capabilities to Enhance Safety Surveillance*

RICHARD PLATT
Professor and Chair of the Department of Population Medicine
Harvard Pilgrim Health Care Institute

2:45 p.m. *Harnessing Web Search Data as Complementary Signals for Pharmacovigilance*

ERIC HORVITZ
Distinguished Scientist & Managing Director
Microsoft Research

2:55 p.m. *Online Discussion Forums as Potential Sources of Adverse Drug Event Data*

JOHN H. HOLMES
Professor of Medical Informatics
University of Pennsylvania

3:05 p.m. *New Frontiers: Surveying Twitter Feeds and Other Social Media*

JOHN BROWNSTEIN
Associate Professor
Harvard Medical School

3:15 p.m. **Panel Discussion and Audience Q&A** (*30 mins*)

Panelists:

- *Next Generation Surveillance* speakers (above), and
- Danica Marinac-Dabic, Director, Division of Epidemiology, Center for Devices and Radiological Health (CDRH), U.S. Food and Drug Administration

3:45 p.m. **Innovation in Modeling and Integrating Information**

Panel Moderator: Darrell Abernethy, Associate Director for Drug Safety, Office of Clinical Pharmacology, U.S. Food and Drug Administration

3:50 p.m. *Statistical Modeling for Efficient and Adaptive Trial Designs Using Composite Endpoints*

BRIAN ALEXANDER
Assistant Professor of Radiation Oncology
Harvard Medical School

4:00 p.m. *Models of Clinical Trial PK/PD Translated To Population Drug Use and Exposure*

SANDY ALLERHEILIGEN
Vice President Modeling and Simulation
Merck

4:10 p.m. *A Quantitative and Integrative Simulation Model for Optimizing Clinical Trial Design to Measure Cognitive Changes of Alzheimer's Disease*

BRIAN CORRIGAN
Senior Director
Pfizer

4:20 p.m. *Assessing the Placebo Effect and Drug Efficacy for Rare Diseases in the Brain Using fMRI*

ARIANA ANDERSON
Assistant Research Statistician
University of California Los Angeles

4:30 p.m. **Panel Discussion and Audience Q&A** (*30 mins*)

Panelists:

- *Innovation in Modeling and Integrating Information* speakers (above), and
- Klaus Romero, Director of Clinical Pharmacology, The Critical Path Institute (C-Path)

5:00 p.m. Wrap-up of Day 1

5:10 p.m. **ADJOURN**

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Day Two

8:30 a.m. Welcome and Reflections from Day 1

MARTIN PHILBERT, *Workshop Co-Chair*
Professor and Dean
University of Michigan School of Public Health

ALASTAIR WOOD, *Workshop Co-Chair*
Partner, Symphony Capital
Professor of Medicine and Professor of Pharmacology, Weill Cornell School of Medicine

SESSION III: ENVISIONING THE FUTURE OF REGULATORY SCIENCE: A FORWARD-LOOKING AGENDA

Session Objectives:

- Discuss opportunities and priorities to advance innovative regulatory science through information.

8:35 a.m. **Disciplinary Components and Infrastructure Needs**

Panel Moderator: Martin Philbert, Professor and Dean, University of Michigan (*Workshop Co-Chair*)

8:40 a.m. *A Workforce to Bridge the Translational and Regulatory Bottlenecks in Drug Development*

GARRET FITZGERALD
Professor of Medicine and Pharmacology
University of Pennsylvania

8:50 a.m. *Core Components of Regulatory Science Curriculum*

SCOTT STEELE
Director of Government and Academic Research Alliances
Associate Professor of Public Health Sciences
University of Rochester

9:00 a.m. *Lessons from Another Sector: Big Data at Northrop Grumman*

SAM SHEKAR
Chief Medical Officer
Northrop Grumman

9:10 a.m. *Training the Regulatory Scientist for Medical Product Development*

OWEN FIELDS
Vice President Regulatory Strategy
Pfizer Inc.

9:20 a.m. **Panel Discussion and Audience Q&A** (*30 mins*)

Panelists:

- *Disciplinary Components and Infrastructure Needs* speakers (above), and
- Peter Honig, Senior Vice President and Head of Worldwide Safety and Regulatory, Pfizer Inc.
- Frank Weichold, Director, Science and Innovation, Office of the Chief Scientist/Office of the Commissioner, U.S. Food and Drug Administration

9:50 a.m. **Day 2 Keynote** (*15 mins; followed by 5 mins of Q&A*)

The Future of Regulatory Science at FDA

STEPHEN OSTROFF
Acting Commissioner
U.S. Food and Drug Administration

10:10 a.m. **BREAK** (*15 mins*)

10:25 a.m. **Presentation of Key Themes/Suggested Paths from Session II Panel Moderators and Session Chair** (*4 speakers; 10 mins each*)

Panel Introduction

STEPHEN OSTROFF
Acting Commissioner
U.S. Food and Drug Administration

10:30 a.m. *Session II moderators*

JOHN WAGNER (moderator of *Identifying and Developing Meaningful Biomarkers*)
Senior Vice President, Head of Clinical and Translational Sciences
Takeda Pharmaceuticals

SHARON HESTERLEE (for Rob Califf, moderator of *Clinical Trial Data Integration*)
Chief Science Officer
Myotonic Dystrophy Foundation

BRIAN STROM (moderator of *Next Generation Surveillance*)
Chancellor of Rutgers Biomedical and Health Sciences
Rutgers, the State University of New Jersey

DARRELL ABERNETHY (moderator of *Innovation in Modeling and Integrating Information*)
Associate Director for Drug Safety, Office of Clinical Pharmacology
U.S. Food and Drug Administration

11:10 a.m. **Reflecting and Envisioning the Regulatory Science Discipline of 2020: Panel Discussion with Session Chairs, Panel Moderators, Panelists, and Audience**

Panel Moderators: Martin Philbert and Alastair Wood (*Workshop Co-Chairs*)

Panelists:

- Session II moderators (above), and
- Eileen Cannon, President, P*h*RMA
- Mark C. Rogers, Board Chairman, Reagan-Udall Foundation

Discussion Questions:

- What are the 3–5 priorities that could advance regulatory science domains?
- Do we have a cohesive approach to advancing the discipline of regulatory science? Are the strategic priorities that have been articulated and adopted by the key players aligned with, and positioned to advance innovative regulatory science?
- What investments and incentives are needed to get us there?
- How to bridge the gap from regulatory science knowledge to regulation and practice?

12:10 p.m. **ADJOURN**