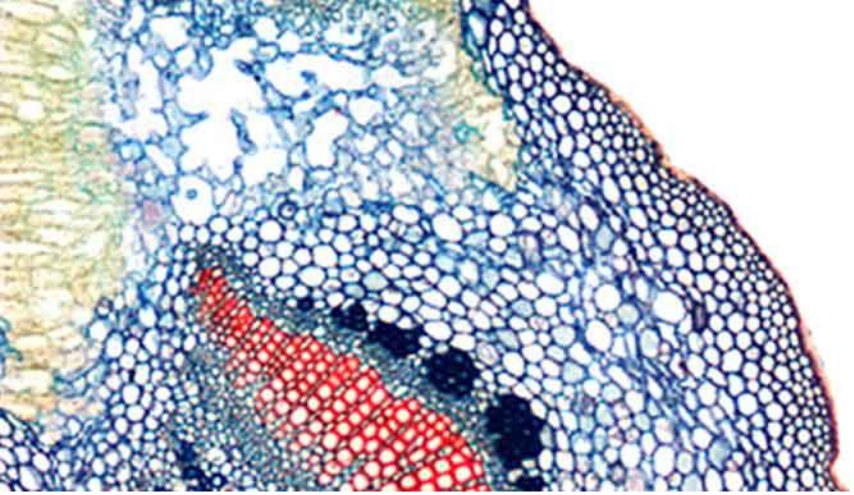
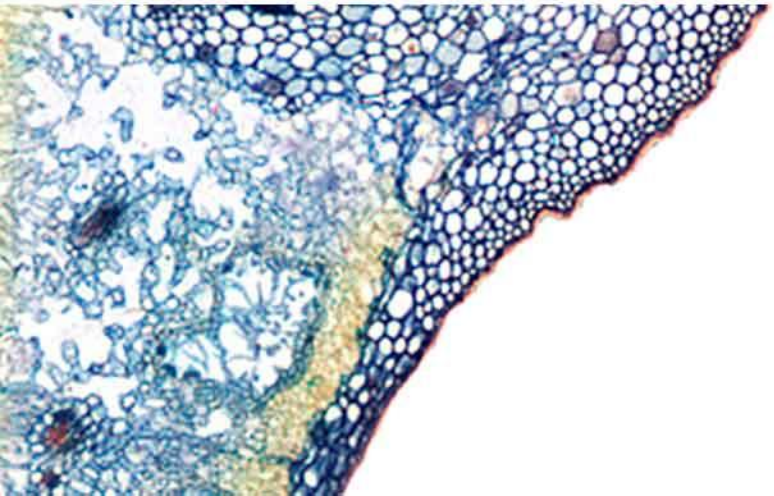


QUINTILES®

Navigating the new health

Using Real-World Data for Outcomes Research and Comparative Effectiveness Studies

Kathy Lang, PhD
Christina Mack, MSPH, PhD



Your Presenters

Kathy Lang

Senior Director, EMR Data & Analytics, Quintiles

Dr. Lang is a health economist with more than 20 years of experience in the field of health economics and outcomes research, with exposure to both the consultant and pharmaceutical side of the business, and particular expertise in database research using a broad range of real-world data sources. She has designed and lead outcomes research studies across a wide array of therapeutic areas and study designs including model-based cost-effectiveness and budget impact analyses, trial-based economic evaluations, retrospective database studies, and software tools for field-based teams. She has published widely in peer-review journals and presented at scientific meetings.

Christina Mack

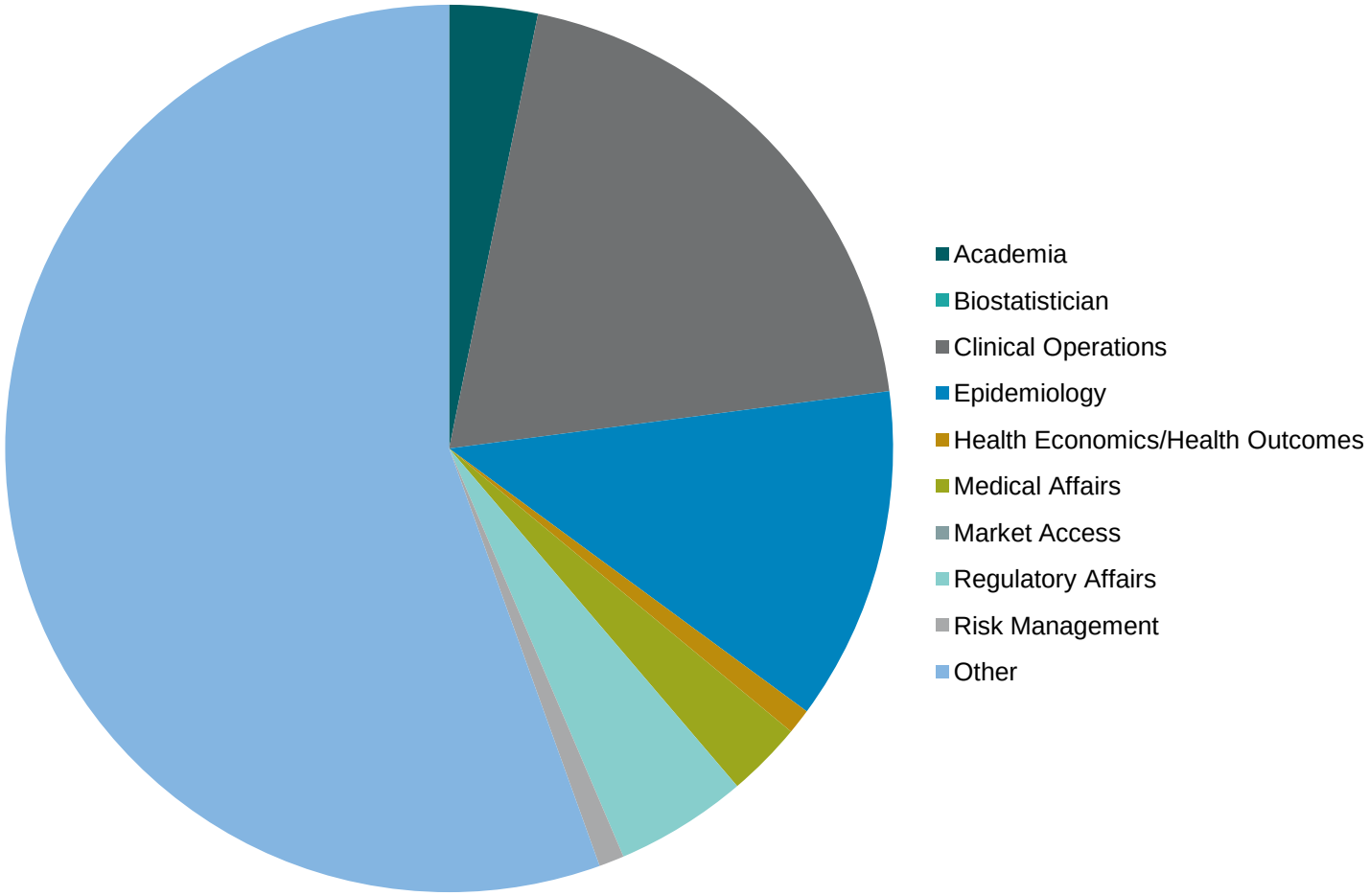
Associate Director, Epidemiology, Real-World & Late Phase Research, Quintiles

Dr. Mack is a pharmacoepidemiologist with global biopharmaceutical experience in applied epidemiologic research, methods development and observational study project management. She has experience with design and analysis of numerous large epidemiologic studies in various real-world data sources and is the lead scientist for the Quintiles COMPASS program, a large distributed data network. She holds a PhD and masters degree in Epidemiology from the University of North Carolina at Chapel Hill and a degree in Computer Science Engineering from the University of Notre Dame. Prior to her current role, Dr. Mack has held positions within large pharmaceutical companies and non-governmental organizations. Dr. Mack is an adjunct assistant professor of epidemiology at the University of North Carolina at Chapel Hill and is an active contributor, presenter and peer reviewer for leading journals and international conferences.

Agenda

- Background
- Continuum of sources
- Key considerations for selecting optimal source
- Study examples
- Q&A

Today's Webinar Audience



Polling Questions

- A small number of polling questions have been added to today's webinar to make the session more interactive

Using Real-World Data: Background

Background

- Advances have improved and expanded available real-world data sources for research use by the biopharmaceutical industry
  - > *Greater leverage of information technology for healthcare data administration*
  - > *Strengthening of observational research methods*
- Insights from real-world data have the potential to influence value-based purchasing and pricing and access to therapy
- Given the number of potential primary and secondary data sources available, selection of an appropriate source is challenging

Objectives

Pragmatic Approaches to Real-World Data Source Selection & Use

- **Discuss evolving continuum of real world data sources**
  - > **Real-world evidentiary needs across pharmaceutical product lifecycle**
- **Strengths & limitations of alternative types of real-world data**
- **Example applications using real-world data**
- **Key considerations in the selection of an appropriate source for outcomes research, safety and comparative effectiveness studies**

With proliferation of Big Data & machine learning tools, the importance of forethought can get lost. But Big Data without intelligent analytics will fail to deliver meaningful insights, regardless of computer processing power.

Evidentiary Needs

Real-World Data Support Variety of Activities Across the Product Lifecycle

Preclinical	Phase I-II	Phase III	Peri-Launch	Phase IV
Market Sizing	Market Landscape	Competitor Reconnaisance	Registries	Safety Surveillance
Unmet Need	Economic Burden	Patient Burden	Global BOIs	Continuous Monitoring
Patient Profilng	Disease History	Treatment Patterns	Target Product Profile	Tailored Therapeutics
Early Modeling	Model Refinements	CE/BI Modeling	CEAs & BIAs	Health Technology Assessments
	Endpoint Development	Endpoint Assessment	Labeled Claims	New Indications
	Instrument Validation	Piggyback Evaluations	Global Value Dossiers	Comparative Effectiveness
			Pricing & Reimbursement	Risk Sharing Arrangements

Polling Question

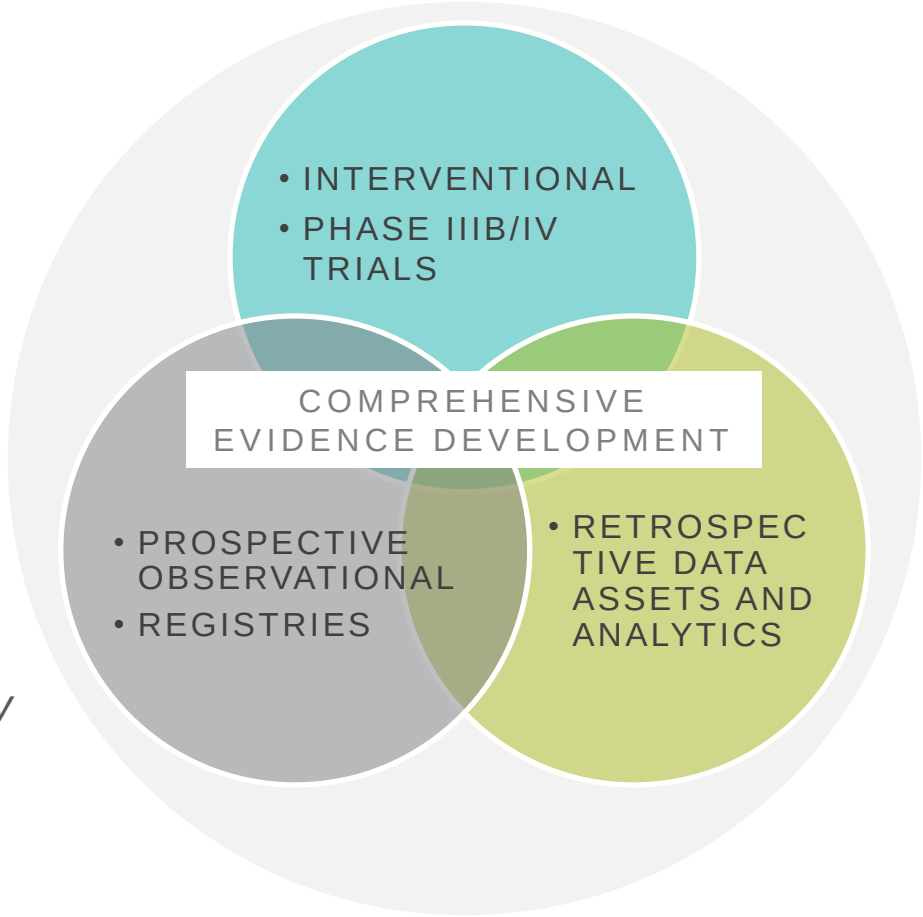
- In which phases of the product lifecycle have you done research involving use of real world data (check all that apply)?

- Phase I
- Phase II
- Phase III
- Phase IV

Using Real-World Data

QUINTILES

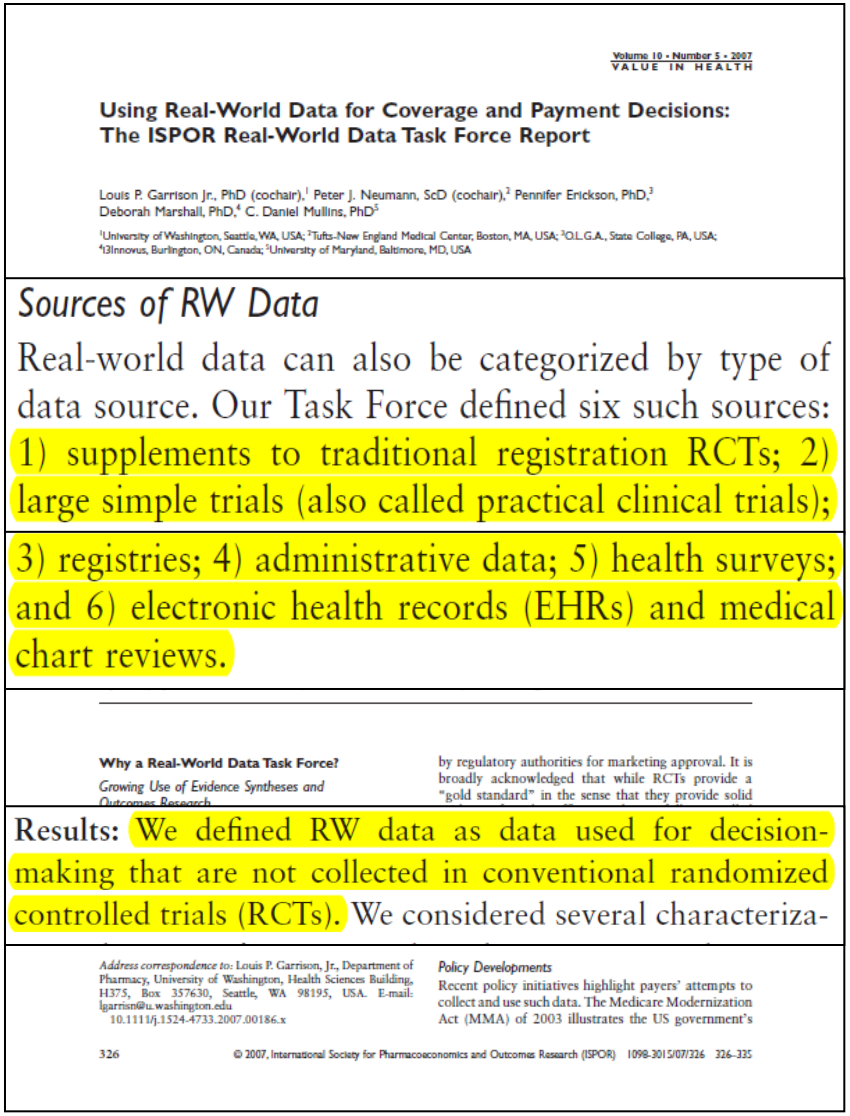
- *Monitor Safety and Evaluate Risk*
- *Demonstrate Efficacy and Effectiveness*
- *Gain Market Access*



- *Expand Labeling and Approved Indications*
- *Understand Natural History of Disease and Treatment*

Real-World Data Fundamentals

Sources as Defined by ISPOR



Volume 10 • Number 5 • 2007
VALUE IN HEALTH

Using Real-World Data for Coverage and Payment Decisions: The ISPOR Real-World Data Task Force Report

Louis P. Garrison Jr., PhD (cochair),[1] Peter J. Neumann, ScD (cochair),[2] Pennifer Erickson, PhD,[3] Deborah Marshall, PhD,[4] C. Daniel Mullins, PhD[5]

[1]University of Washington, Seattle, WA, USA; [2]Tufts-New England Medical Center, Boston, MA, USA; [3]O.L.G.A., State College, PA, USA; [4]3Innovus, Burlington, ON, Canada; [5]University of Maryland, Baltimore, MD, USA

Sources of RW Data

Real-world data can also be categorized by type of data source. Our Task Force defined six such sources: 1) supplements to traditional registration RCTs; 2) large simple trials (also called practical clinical trials); 3) registries; 4) administrative data; 5) health surveys; and 6) electronic health records (EHRs) and medical chart reviews.

Why a Real-World Data Task Force?

Growing Use of Evidence Syntheses and Outcomes Research

by regulatory authorities for marketing approval. It is broadly acknowledged that while RCTs provide a "gold standard" in the sense that they provide solid

Results: We defined RW data as data used for decision-making that are not collected in conventional randomized controlled trials (RCTs). We considered several characteriza-

Address correspondence to: Louis P. Garrison, Jr., Department of Pharmacy, University of Washington, Health Sciences Building, H375, Box 357630, Seattle, WA 98195, USA. E-mail: lgarrisn@u.washington.edu

10.1111/j.1524-4733.2007.00186.x

Policy Developments

Recent policy initiatives highlight payers' attempts to collect and use such data. The Medicare Modernization Act (MMA) of 2003 illustrates the US government's

 1098-3015/07/326 326–335

Real World Data Types

Primary Data

- **Supplements to traditional RCTs:**
  - > Commonly known as trial-based or ‘piggyback’ evaluations
  - > Useful for collecting health economic information alongside clinical trials (quality of life, PRO, healthcare utilization)
- **Large simple trials:**
  - > Commonly known as pragmatic or naturalistic trials
  - > Attempt to measure effectiveness of an intervention in a real-world setting (routine practice)
- **Registries:**
  - > Include prospective cohort studies
  - > Collect data on group of patients with a given condition

All involve a CRF or data collection instrument

Real World Data Types

Primary Data (Cont.)

- **Health surveys:**
  - > Useful for basic epidemiologic data or macro-level views on utilization
  - > Useful for obtaining PROs and patient and physician views
- **Medical chart reviews:**
  - > Abstracting patient demographic and clinical data from patient charts

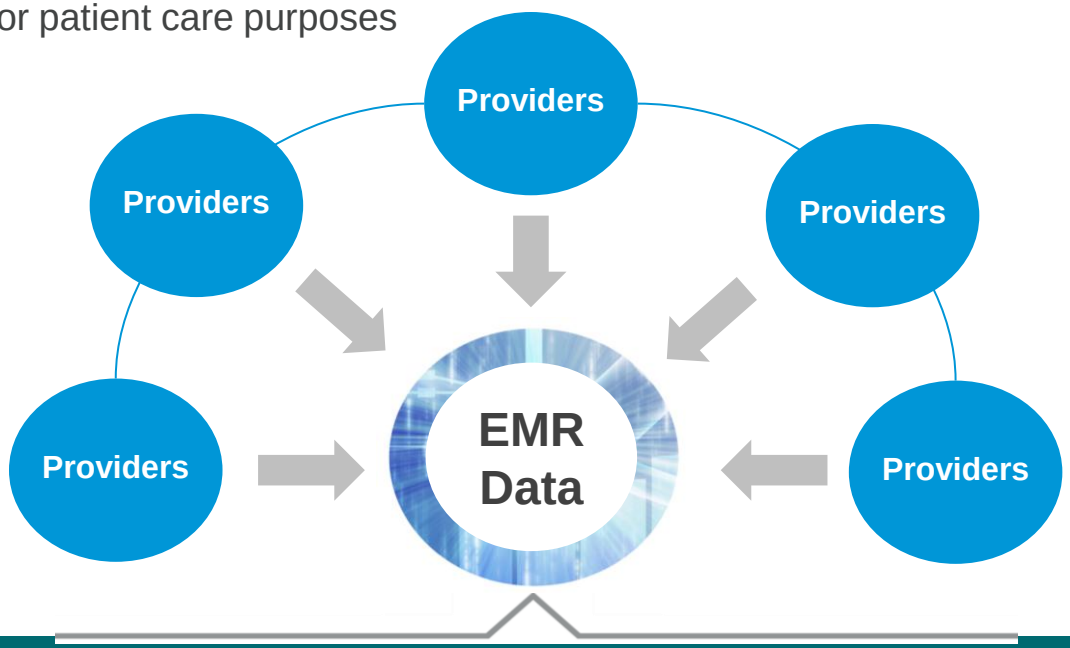
All involve a CRF or data collection instrument

Real World Data Types

Secondary Data

- **Administrative data:**
  - > Also known as claims data
  - > Collected for billing purposes
  - > Organized by bill for service (inpatient, outpatient, physician, Rx)

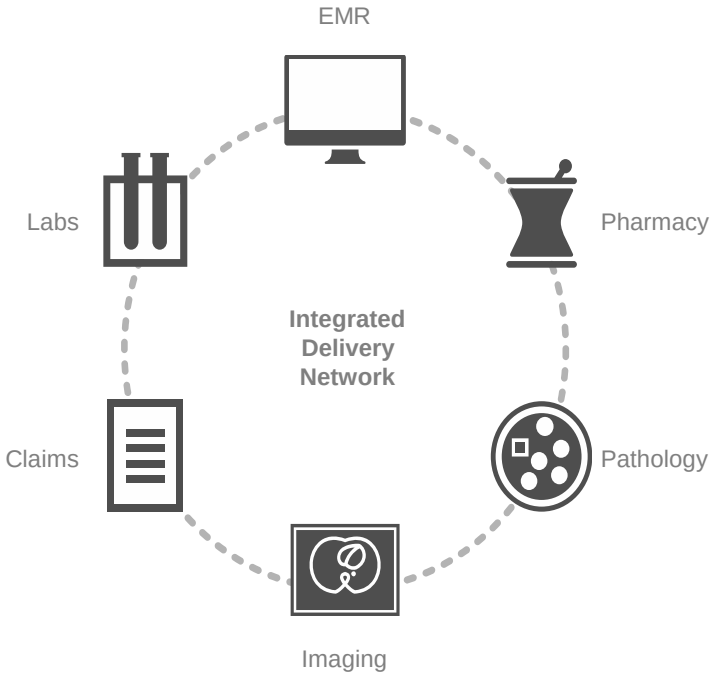
- **Electronic health or medical records:**
  - > Electronic health records also called electronic medical records (EMRs)
  - > Aggregated from medical practices, giving point of entry to provider networks
  - > Collected for patient care purposes



Real World Data Types

Secondary Data (Cont.)

- **Linked EMR-claims:**
  - > Integrated delivery networks (IDNs)
  - > A network providing patients with a continuum of care
  - > Gives rise to innovative research possibilities
    - Hybrid designs



Classifying Real-World Data Sources

Two-by-Two Typology Facilitates Critical Review

	Retrospective Designs	Prospective Designs
Primary Data Collection	Medical Chart Review	RCT Piggybacks Pragmatic Trials Registries Health Surveys
Secondary Data Collection	Administrative Claims EMR	Automated EMR Data Feeds

Classifying Real-World Data Sources

QUINTILES

Strengths & Limitations of Prospective Sources

	Prospective Designs
Primary Data Collection	RCT Piggybacks Pragmatic Trials Registries Health Surveys
Secondary Data Collection	Automated EMR Data Feeds

- **Key Strengths:**
  - > High degree of control over what data are collected—and how
  - > For stand-alone studies, fine-tuning of sample size is possible
  - > For stand-alone studies, upfront control of confounding & bias is possible, even for real-world care patterns

- **Key Limitations:**
  - > Prospective data more costly than retrospective—sometimes by orders of magnitude
  - > For RCT piggybacks, no fine-tuning of sample size is possible—and statistical power is usually lacking for RW measures
  - > For RCT piggybacks, protocol-driven care undermines generalizability to real world

Classifying Real-World Data Sources

Strengths & Limitations of Retrospective Sources

	Retrospective Designs
Primary Data Collection	Medical Chart Review
Secondary Data Collection	Administrative Claims EMR

- **Key Strengths:**
  - > Data already exist in charts / computer systems ➔ Economy of data collection
  - > Potential for enormous sample sizes almost instantaneously
  - > Data reflect real-world patterns of care, not affected by study protocol
  - > Data mining approaches can uncover key relationships not on clinical radar

- **Key Limitations:**
  - > Data already exist in charts / computer systems ➔ What you see is what you get
  - > Potential for enormous sample sizes, yes, but not for products in development
  - > Numerous sources of confounding & bias, not all of which can be controlled

RWD Practical Comparison

QUINTILES

Characteristic	Administrative Claims	Electronic Medical Records	Primary Data
Patient Details	Basic demographics (age, sex) plus enrollment	Demographics plus vital signs, BMI, allergies, smoking status	Flexibility on what is collected (demographic and clinical characteristics and vitals and history)
Medications	Drug code (name, form, strength), Rx fill date, amt supplied, dose & freq for pharmacy-dispensed drugs; no OTC	Mostly same detail for Rx's written (but no Rx fill date); current meds, including OTC products, available	Detail on medications prescribed including OTC
Diagnostics	ICD-9 codes	ICD-9 codes, problem lists, severity, symptoms	Full detail from chart with flexibility on collection
Procedures	CPT® codes	CPT® codes	Full detail from chart with flexibility on collection
Laboratory	CPT® codes, date; limited availability of lab results	CPT® codes, date, & e-feed of lab results sometimes including pathology & radiology	Detail on labs and pathology collected and results available
Hospital	Dates of admission & discharge, diagnoses, major procedures; usually nothing on inpatient drugs	Hospital EMR: detail on all aspects of inpatient care, including day:time info; ambulatory EMR: not much	Full detail from chart with flexibility on collection
Financial	Charges, amounts reimbursed, co-pays	Usually not available	Usually not available

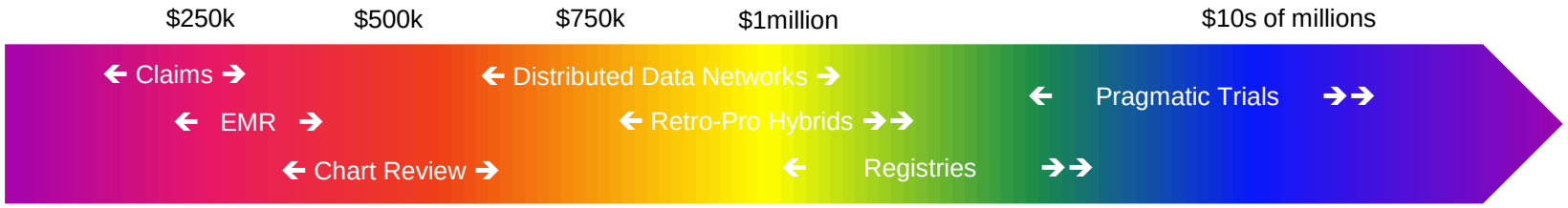
RWD Practical Comparison

QUINTILES

Characteristic	Administrative Claims	Electronic Medical Records	Primary Data
Insurance Coverage	Insured only (usually one type)	Treatment independent of insurance, includes uninsured	Treatment independent of insurance; includes uninsured
Geographic Settings	Mostly US only	EMRs proliferating in US & ex-US settings	Generally smaller settings
Ease of Analysis	Relatively easy	Harder, particularly for unstructured data	Easy given control over how data are collected
Ease of Linkage	Do-able but not easy without compromising PHI	Do-able but not easy without compromising PHI	Can sometimes link to claims or other information
Data Completeness	High for elements essential to reimbursement	High for elements essential to patient management	Complete given control over CRF
Timeliness	Time lag usually measured in months or quarters	Time lag usually measured in days or weeks	Takes time to collect and enter

Classifying Real-World Data Sources

How Real-World Sources Array Across the Cost Spectrum



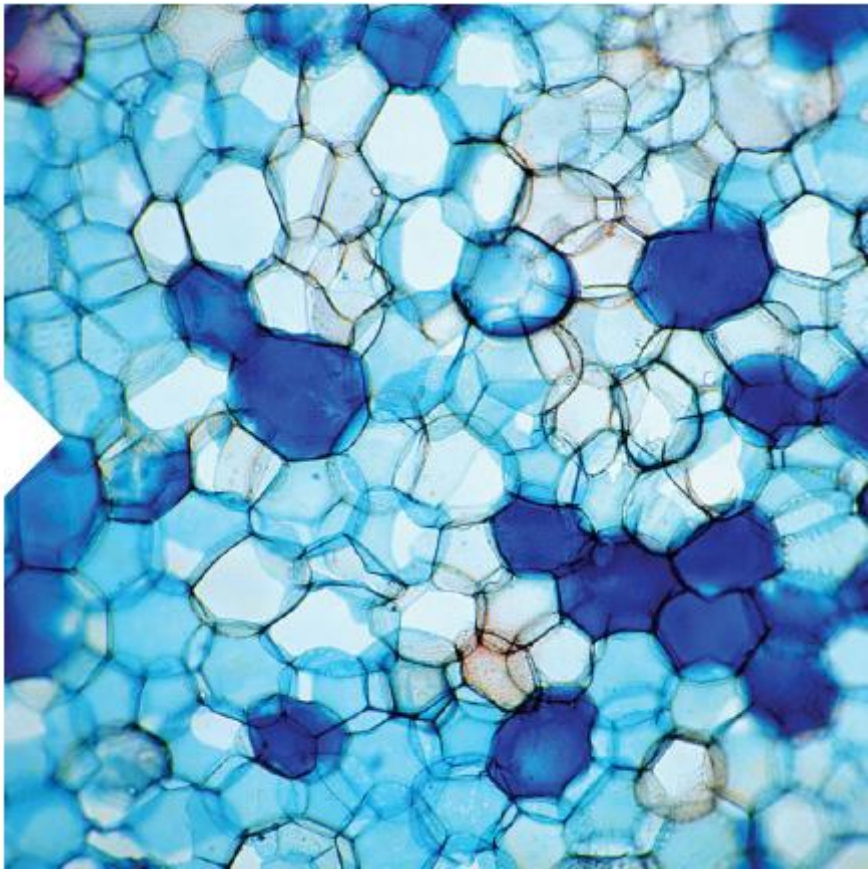
- Studies involving different kinds of RWD sources naturally array across the cost spectrum according to time & effort in data collection
- Retrospective sources congregate on the lower end, purely prospective sources on the higher end
- Emerging approaches involving retro-to-pros hybrid designs are in between

Polling Question

For your future research, what type of data do you see as being most important:

- Primary data collection
- Use of secondary data sources
- Combination (hybrid studies)

Study Examples



Comparing Patient-Centered Outcomes after Treatment for Uterine Fibroids

QUINTILES

Sponsor

Patient-Centered Outcomes Research Institute (PCORI)

Research challenge

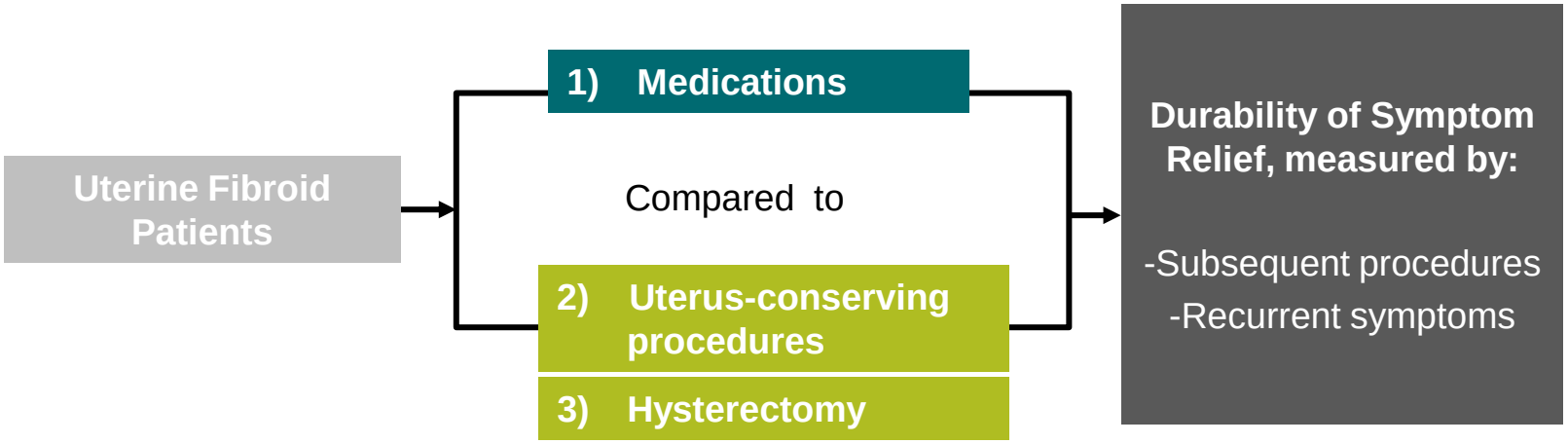
Guide informed decisions about which uterine fibroid treatment options are most likely to result in outcomes of greatest importance to each patient.

Objective

- Compare durability of symptom relief, measured by **subsequent procedures**, after uterus-conserving treatments
- Compare durability of symptom relief, measured by **recurrent symptoms**, after any procedural treatment (including hysterectomy)

Reference: PCORI funding awards. http://pfaawards.pcori.org/node/20/datavizwiz/detail/40716

Comparing Patient-Centered Outcomes after Treatment for Uterine Fibroids

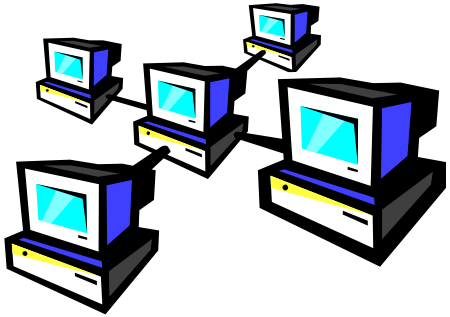


Key drivers:

- Geographic differences in treatment
- Length of follow-up
- Hysterectomy makes randomization challenging

Retrospective observational study: EMR and claims

- **Quintiles EMR and Truven MarketScan claims data**
  - Over 13,000 patients with UF diagnosis
  - Clinical and laboratory information from outpatient EMR records
  - Hospitalizations, emergency dept visits, other medical care and healthcare costs by service type from claims



- **Quintiles COMPASS* Research Network**
  - Over 12,000 patients with UF diagnosis
  - Federated network of integrated healthcare delivery systems (IDNs)
  - Patient information available across the continuum of care; EMR records include hospitals, clinics physician offices

* COMparative effectiveness and PAtient Safety and Surveillance

Patterns of Diabetes Care

Sponsor

Industry

Research question

How do practice and referral patterns affect outcomes in management of patients with type 2 diabetes?

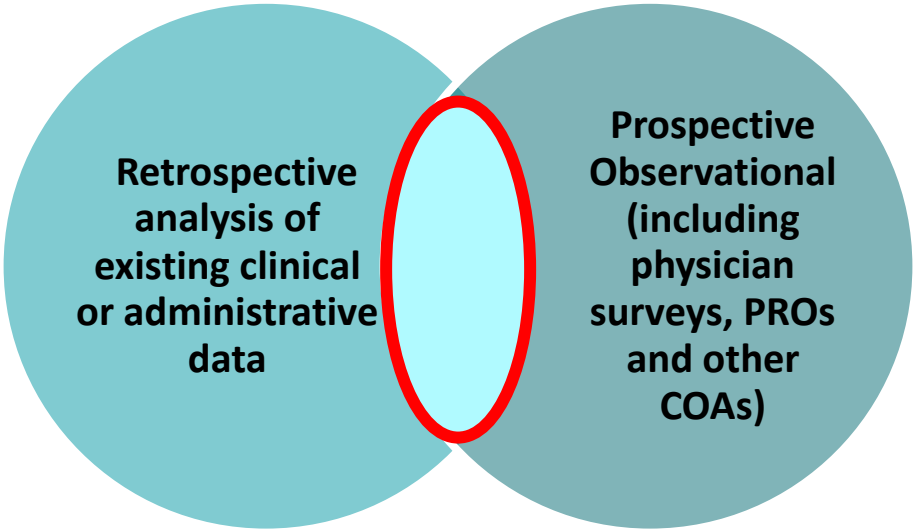
Objectives

- Describe usual care practice patterns at the sites providing initial diabetes care overall and by specific site/provider characteristics
- Describe usual care practice patterns and transition of diabetes care at referral sites
- Describe the effect of practice and referral patterns on selected outcomes, including:
  - Glycemic control
  - Titration and Dose
  - Persistence & Adherence
  - Discontinuation & Switching
  - Side effects
  - Complications

Hybrid study design

Key drivers:

- Reduce burden of data collection on sites
- Important endpoint: reasons for switching and discontinuation

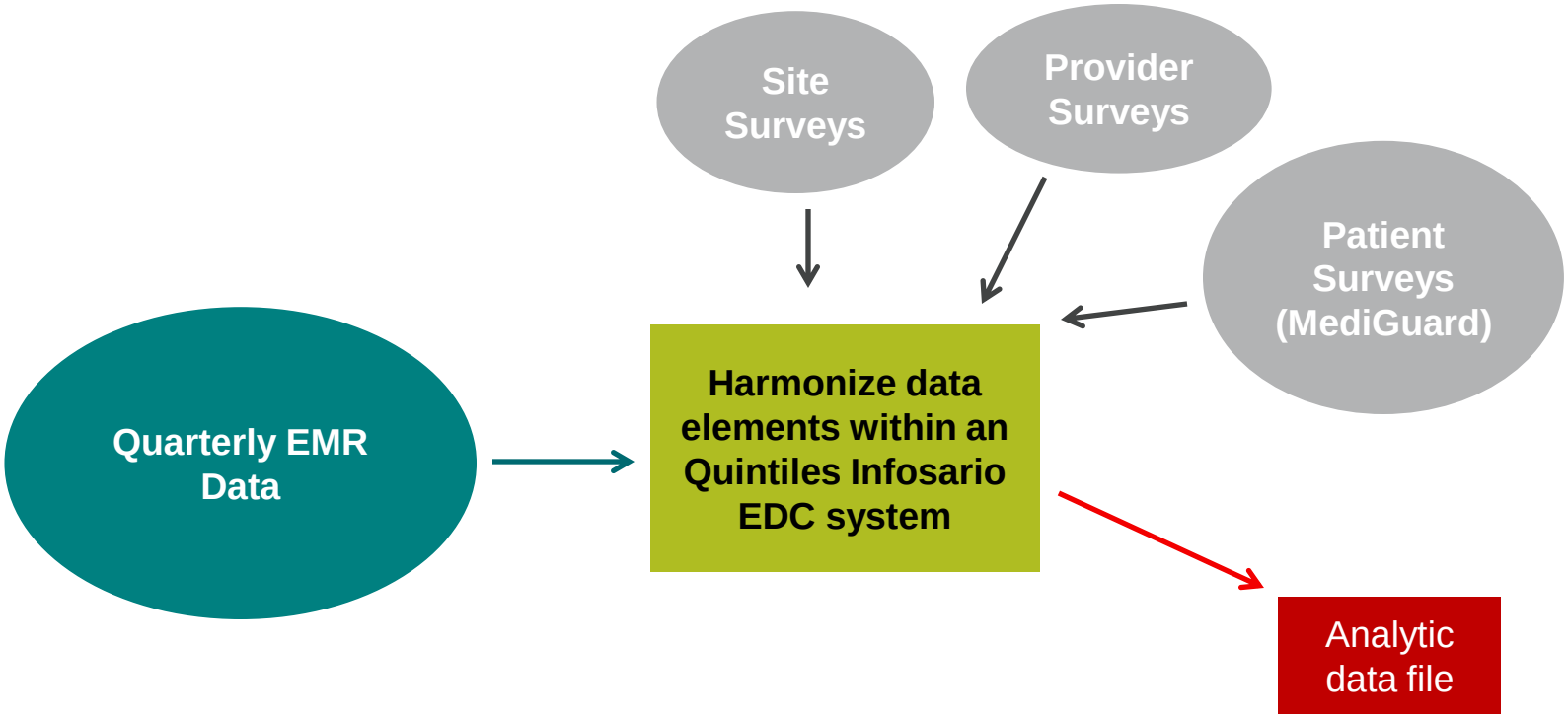


- Incorporate active and automated (passive) data collection
- Observational follow-up with *de novo* data collection or the use of routine data
- May have interventional/ experimental design (Pragmatic Trial)

Hybrid study: EMR and prospective surveys

Engaged two large research groups:

- FORWARD: Large diabetes-focused Provider-Based Research Network (PBRN)
- COMPASS: Collaborative group of Integrated Delivery Networks



Registry in Glaucoma Outcomes Research (RiGOR)

Sponsor

U.S. Agency for Healthcare Research and Quality (AHRQ)

Research challenge

Compare the effectiveness of treatment strategies for primary open-angle glaucoma, in response to the U.S. IOM “Initial National Priorities for CER”

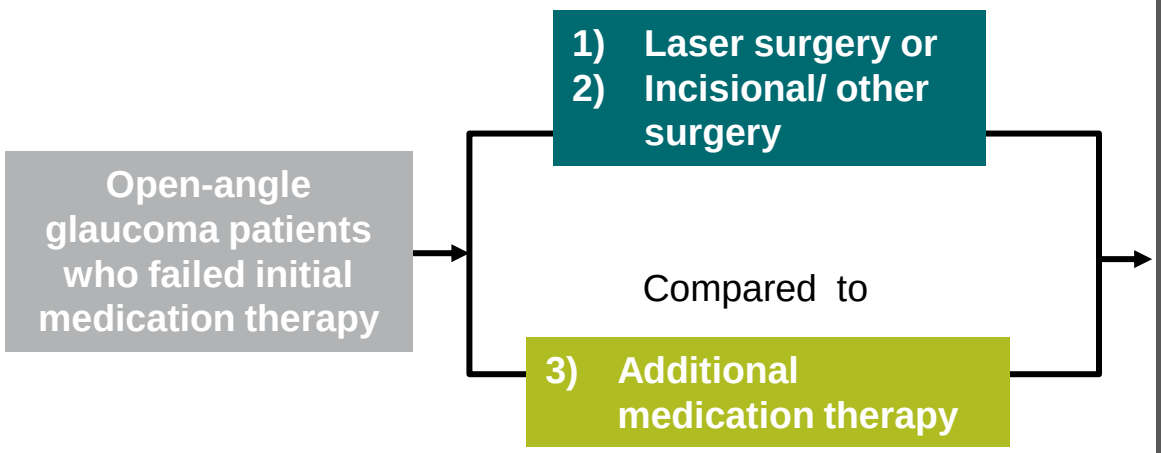
Objective

Compare response to treatment for (1) patients treated with laser surgery and (2) incisional/other surgeries with (3) patients receiving additional medication, at one year post-treatment for the following outcomes:

- ≥ 15% reduction in Intraocular Pressure (IOP) - **primary endpoint**
- Improvement in Patient-Reported Outcomes and Quality of Life
- Glaucoma severity and visual acuity measures
- Subsequent surgeries, incidence of complications

Reference: Gliklich R, Dreyer N, Leavy M, eds. Registries for Evaluating Patient Outcomes: A User’s Guide. 3rd ed.

Registry in Glaucoma Outcomes Research (RiGOR)



Primary Outcome
- ≥ 15% reduction in Intraocular Pressure Reduction

Patient-Reported Outcomes
- Improvement in QOL
  - -Glaucoma Symptom Score
  - -NEI-VFQ-25

Clinician-Reported Outcomes
- Glaucoma Severity Scale
- Improved Visual Acuity (Snellen method)

Study-specific clinical
- Subsequent surgeries
- Incidence of complications

Key drivers:

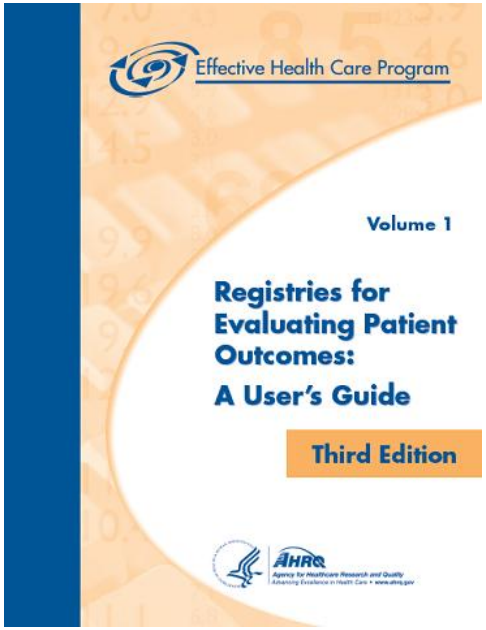
- Consistency of clinical measures
- Direct to patient measures

Reference: Gliklich R, Dreyer N, Leavy M, eds. Registries for Evaluating Patient Outcomes: A User's Guide. 3rd ed.

Primary data collection: Prospective patient registry

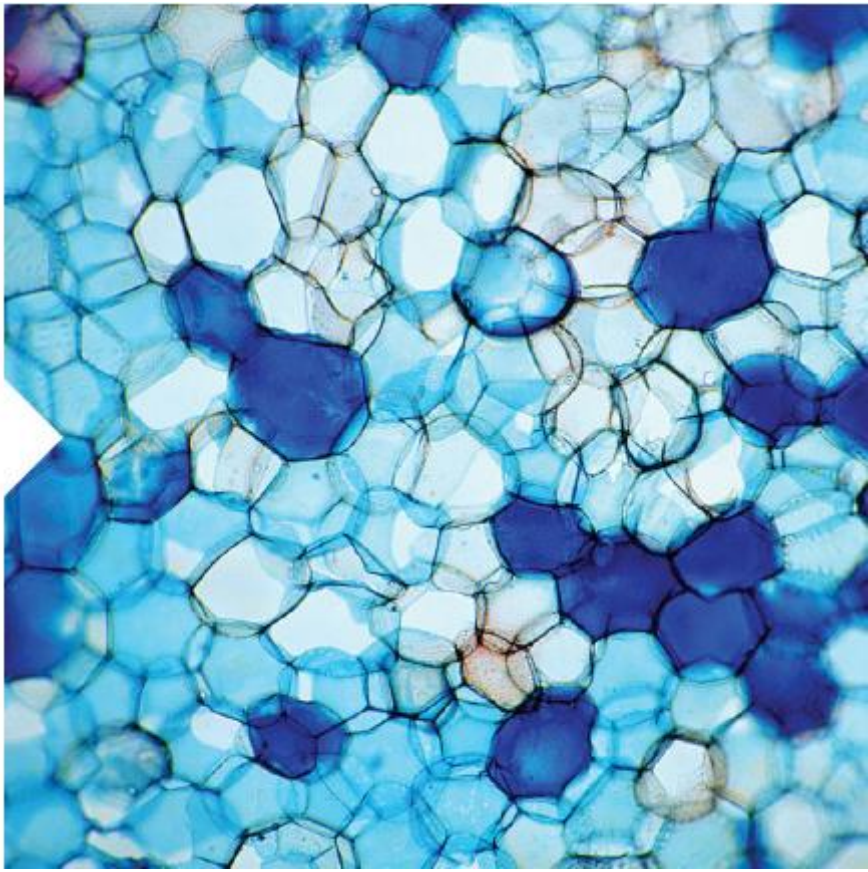
Patient registry: Organized system that uses observational study methods to collect uniform data (clinical and other).

RiGOR was able to collect data on a large enough sample to perform subgroup analyses in key populations, and capture endpoints in a real-world setting.



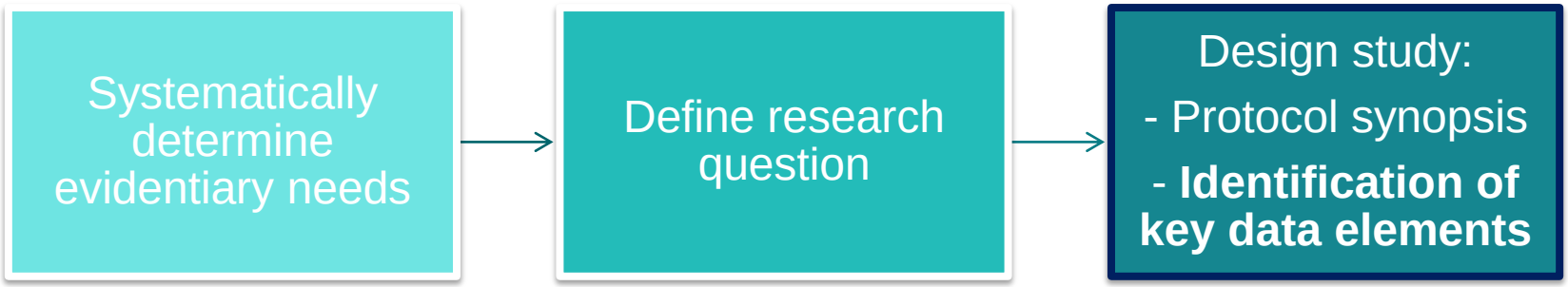
Derived from: Gliklich RE, Dreyer NA, Leavy, M, eds. Registries for Evaluating Patient Registries: A User's Guide. 3rd ed.

Evidentiary Needs as a Guide to Selection of Real-World Data Sources



Data element identification

How to use evidentiary needs to guide optimal choice of real-world data sources

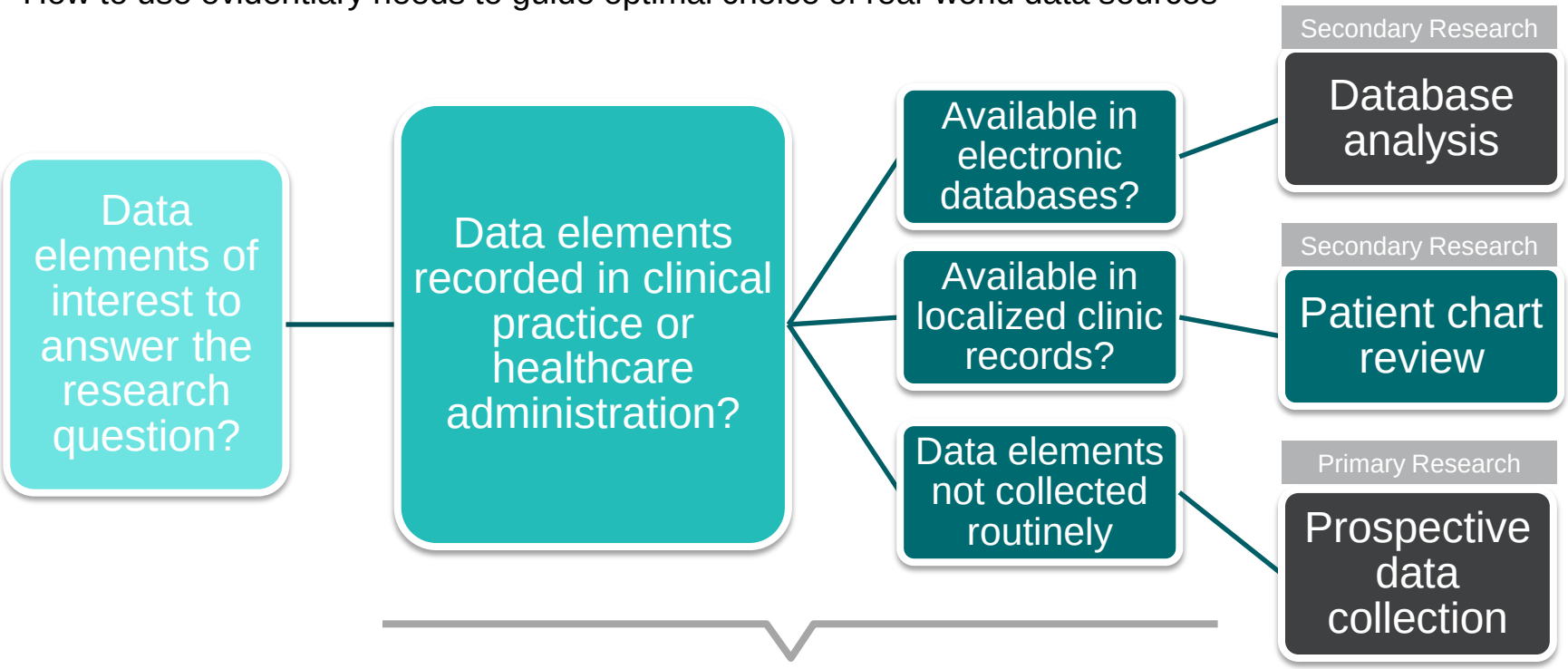


Data element groupings:

- Baseline demographic and clinical characteristics
- Treatments and procedures
- Clinical outcomes
- Diagnoses of interest and comorbidities
- Hospital and provider information
- Financial and payor information

Pathway to determining data source

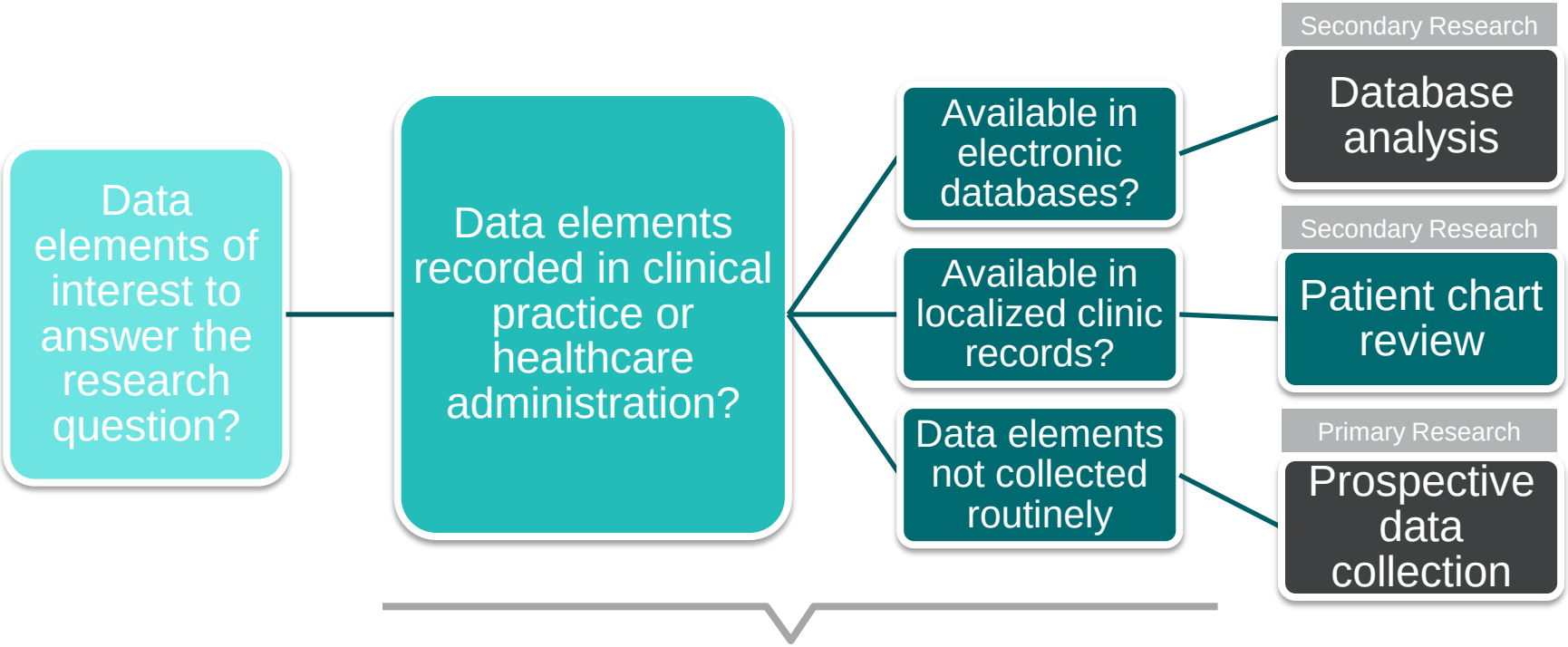
How to use evidentiary needs to guide optimal choice of real-world data sources



Real-World Database Assessment

Pathway to determining data source

How to use evidentiary needs to guide optimal choice of real-world data sources



Real-World Database Assessment

1. Identify databases
2. Ascertain interest
3. Survey database attributes
4. Score & weight
5. Analyse

Real-world Database Assessment

Local contacts

Internal knowledge

Literature searches

Database repositories:

- Bridge to Data
- ENCePP
- ISPOR Intl Digest of DB

Initial outreach for interest in commercially sponsored research

Survey databases to gather information for decision-making

Key questions for evaluating an external data source

QUINTILES

- Are the key variables available to define an analytic cohort and identify relevant exposures, outcomes, endpoints and covariates?
- Are the key variables available for identifying important subpopulations for the study?
- Are the data sufficiently granular for the purpose of the study?
- Are there a sufficient number of exposed individuals in the dataset?
- How would this work? [Ownership, contracting, price, ability to directly contact sites]

Adapted from: Velentgas P, Dreyer NA et al., eds. Developing a Protocol for Observational Comparative Effectiveness Research: A User's Guide.

Example: Survey

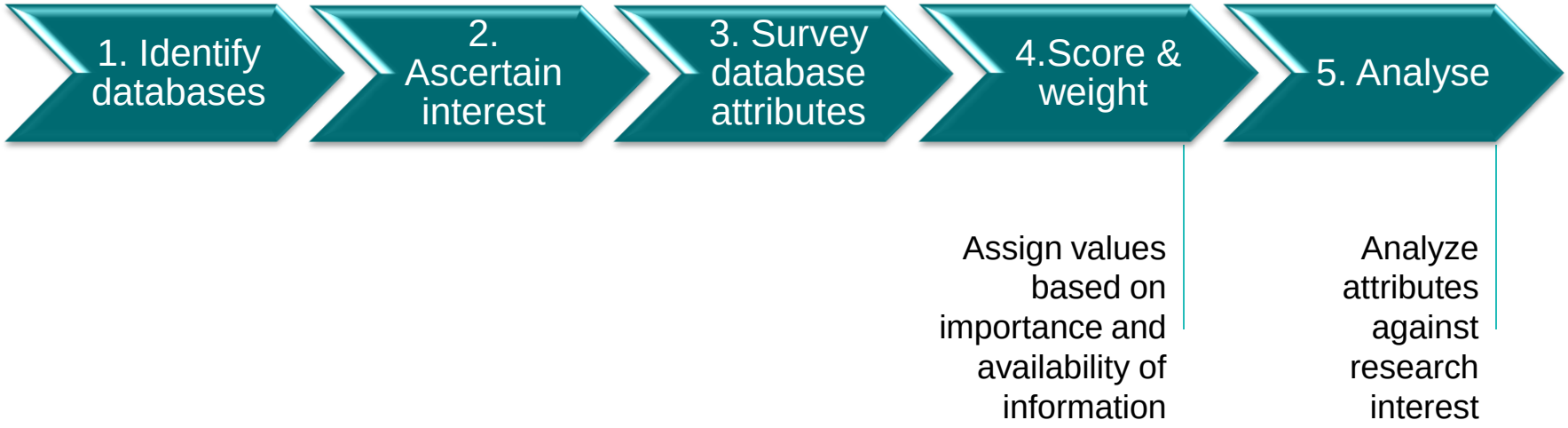
QUINTILES

General database attribute checklist
General information:
Description and type of database (in patient, out patient, claims data, other)
Database content:
Patient demographics (address, age, gender, race)
Outcome data (clinical endpoints, mortality, lab reports, other)
Treatment data (prescriptions, surguries, other)
Resource utilization (admissions, referrals, doctor visits , other)
Technical details:
Coding system (for diagnosis, prescriptions, and surgical procedures)
Data linkage potential (unique identifiers, legal aspects)
Access scheme (open for public, for fees, ethical approval obligation to publish)
Contact details

Questions determined according to evidence gaps

Access to Real-World Databases in Europe – How to find the right one to answer your research question. ISPOR. 17th Annual Meeting, June 2-6, 2012 – Washington, DC, USA

Real-world Database Assessment



Conclusion

Pragmatic Approaches to Real-World Data Source Selection & Use

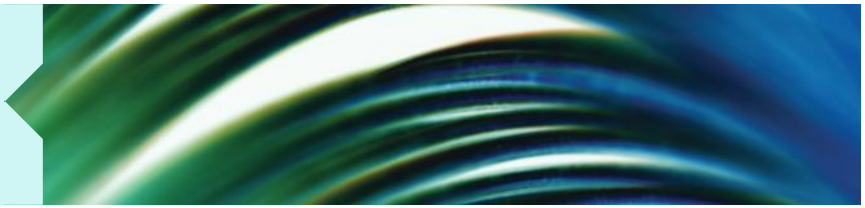
- **Real-World data are a valuable asset for research at all points of the drug development process**
- **The various types of real-world data are associated with specific strengths and weaknesses**
- **A systematic approach to database selection can help achieve your study goals**

Questions?

Upcoming Events

QUINTILES

Real-World and Late Phase
Research Webinars



Quintiles experts run regular webinars on Real-World & Late Phase services.

Topics include:

- DIABETES VALUE DEMONSTRATION
- ONCOLOGY VALUE DEMONSTRATION
- RARE DISEASE REGISTRIES
- EUROPEAN PHARMACOVIGILANCE LEGISLATION
- REGISTRIES 101
- MARKET ACCESS
- MAXIMIZING VALUE AND QUALITY IN PHASE IV

To register or view previous webinars please go to
www.quintiles.com/real-world-late-phase-webinars

Thank you

Questions?