



What Competencies are Necessary for HEOR Professionals? An Update on the ISPOR Competency Framework

James Murray, PhD
Eberechukwu Onukwugha, PhD
Tsung-Ying Lee, BPharm, MCLinPharm
Laura T. Pizzi, PharmD, MPH

Tuesday November 30, 2021 @ 12:30-1:30pm CET

Objectives of this Session

1. Explain the collaborative process used by the ISPOR Institutional Council and Faculty Advisor Council to identify and validate the Framework
2. Identify what competencies matter most in six common HEOR job types based on results from survey findings
3. Share ongoing efforts to systematically define the topical content within each competency, with 2021 efforts focusing on the statistical methods competency.



Brief History of the ISPOR Competency Framework Initiative

- Initiated in 2016
- Idea originated with the Institutional Council
- Faculty Advisor Council engaged soon thereafter
- Published in 2020 in *Value in Health*
- Led to development of the US Healthcare Payers short course (brought HTA Council in as third collaborator)
- Now working on expanding the detail in the Statistical and Research Methods competency



Open Access article available here:

<https://www.sciencedirect.com/science/article/pii/S1098301520321240>

Relevance of the Competency Framework to ISPOR's Mission

- Mission: To promote health economics and outcomes **research excellence** to **improve decision making** for health globally
 - Competency Framework promotes **research excellence** by outlining the knowledge and skills necessary to conduct and report health economics and outcomes research
 - Competency Framework promotes **improved decision making** by specifying that an understanding of the healthcare system, health technology assessment, and HEOR communication are necessary for professionals in our field



Connecting the Dots: How the Competency Framework Relates to other ISPOR Initiatives

- Education Programs
- Content Strategy
- Councils:
 - Institutional Council
 - Faculty Advisor Council
 - HTA Council
 - Patient Council
- Student Network
- Career Center





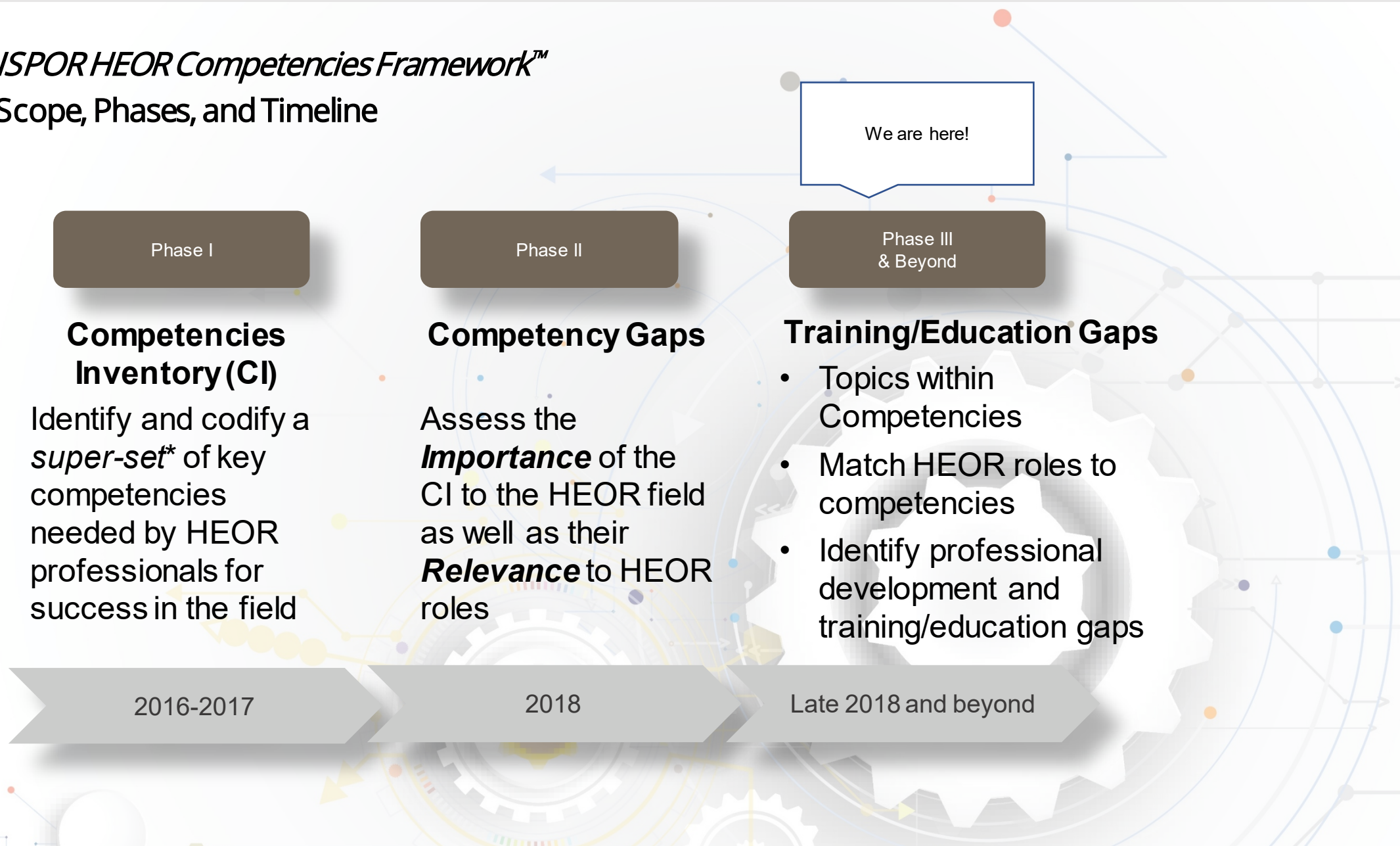
1

Background



ISPOR HEOR Competencies Framework™

Scope, Phases, and Timeline



- Three surveys were conducted to understand the importance & relevance of the ISPOR Competencies to the general members as well as the coverage that the competency is covered within HEOR-related degree programs.
- **General Member Survey**- Assess the importance and relevance of all 41 competencies by job type and work setting
- **Academic Member (Faculty) Survey** – Assess how the competencies are currently covered within academic programs
- **Academic (Student Member) Survey** – Assess how the students are currently exposed to the competencies within their curriculum.

We targeted all ISPOR members excluding Academics and Students.

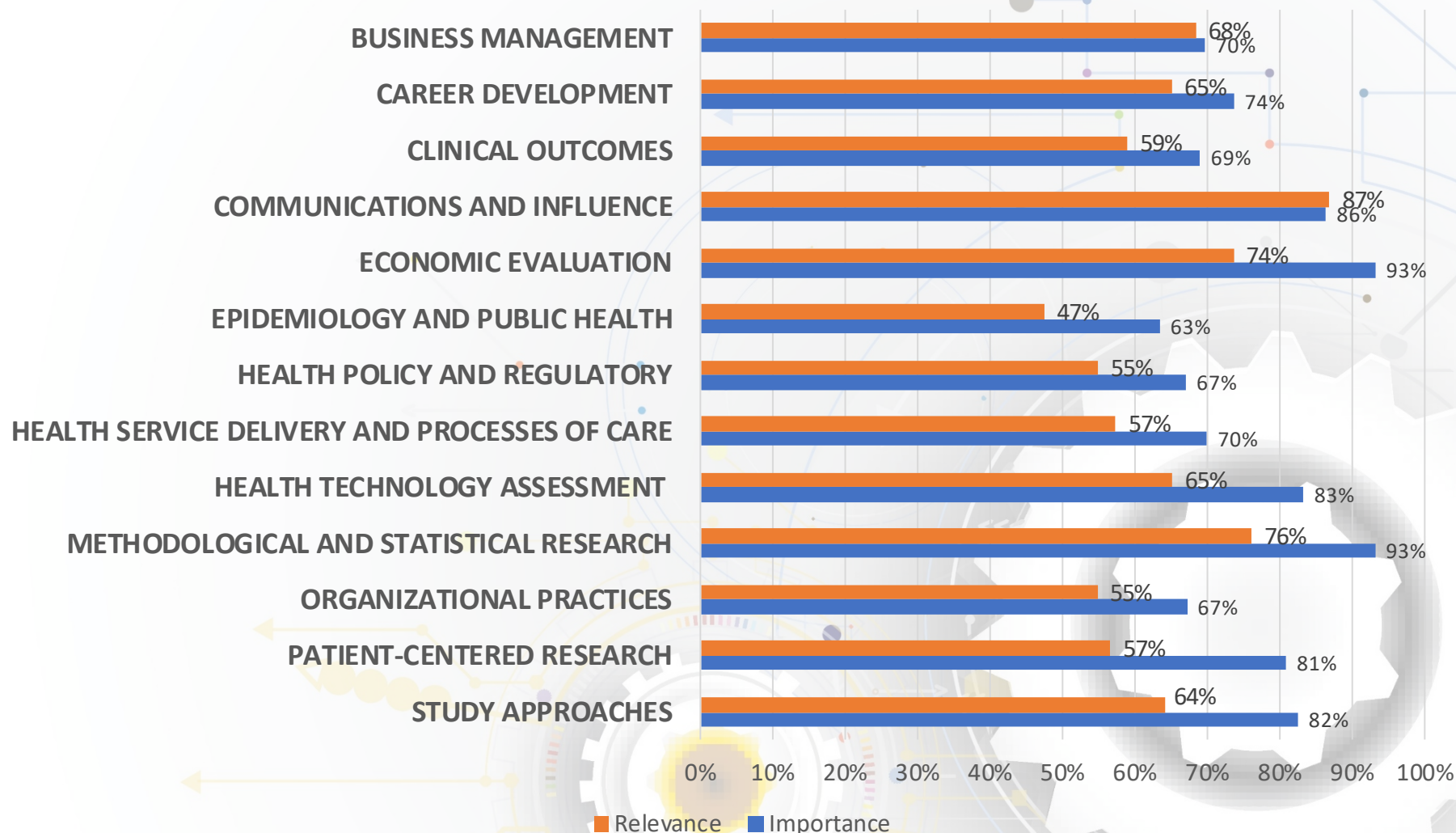
Goal was to validate the competencies by

- ***Importance*** is how necessary it is to have a competency within the overall HEOR discipline. Importance was rated by a 5 point scale where only “Important” or “Critically important” responses were counted.
- ***Relevance*** of each competency to the specific HEOR role held by the respondent. Relevance was rated by a 5 point scale for how relevant the competency is to a respondent’s current role. Again, only “Very Relevant” and “Relevant” response were counted.

The survey was completed in August 2018. We had 493 responses from a potential pool of ~11,000 ISPOR members (response rate = ~4%)

Importance and Relevance of the Competency Categories/Domains

Importance and Relevance by Domain



* The average proportions would be >95% if we included “Somewhat important” or “Somewhat relevant” (3)

Frequency by Job Type (N=493)

Job Type	N	%	Job Type	N	%
HEOR Generalist (health economics and health outcomes research)	145	29%	Epidemiologist	10	2%
Health Economist	87	18%	Non-HEOR Therapeutic Area role (e.g. product team)	10	2%
HEOR Management or Administration	41	8%	Outcomes or Medical Liaison (field-based outcomes customer support)	6	1%
Health Technology Assessment	40	8%	Consultant	5	1%
Real World Evidence and Observational Study Specialist	35	7%	Communications/Medical Writing	5	1%
Patient Reported Outcome/Clinical Outcomes Assessment	28	6%	Clinical Trialist	4	1%
Pricing, Access and Reimbursement	22	4%	Patient Representative	3	1%
Health Policy	18	4%	Medical Affairs	2	0%
Statistician or Statistical Analyst	16	3%	HEOR Education Specialist	2	0%
Practicing Physician, Nurse, Pharmacist, or other Clinician	11	2%	Other	3	1%

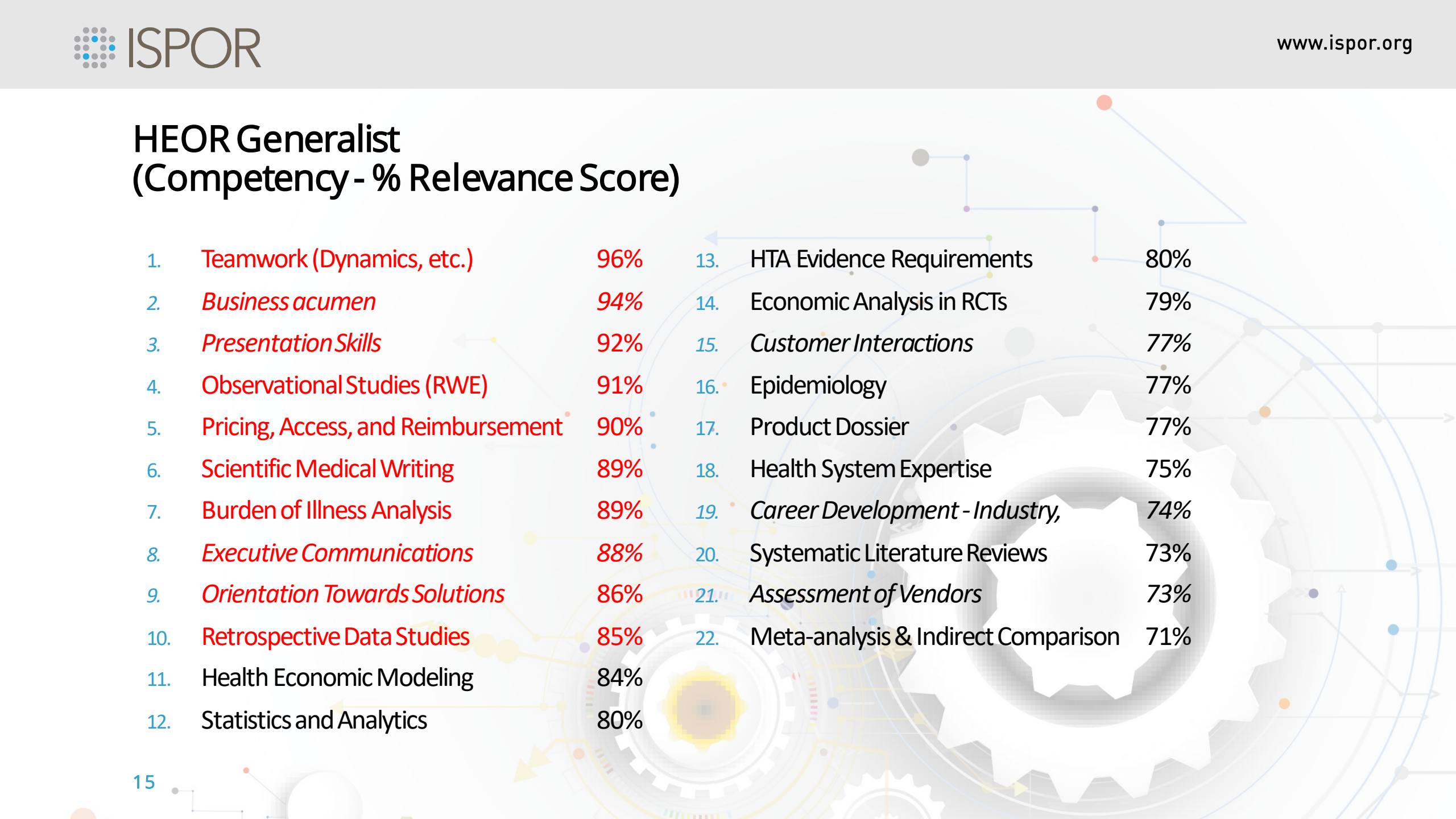
2

Relevant Competencies within each Role

Key to Next Slides

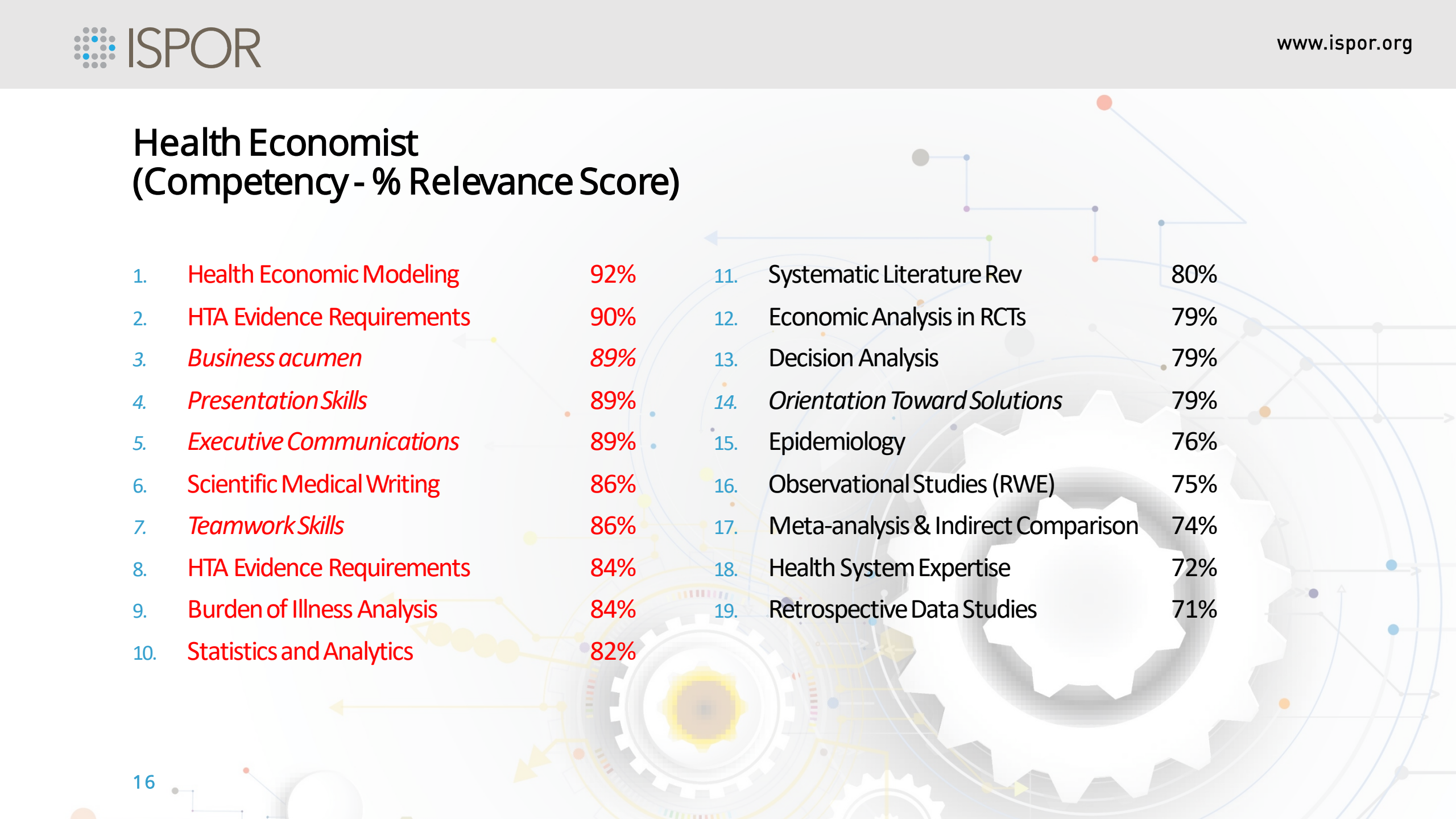
- We will review the most relevant competencies for each of the six career tracks.
- The competencies are listed in order based on the most to least relevant competencies. The Top 10 are presented in **RED**.
- The formal requirements for each Specialty are not officially set. A cutoff $\geq 70\%$ relevance was used to assess which competencies were considered most relevant for a career track.
- “Softer” skills are italicized for easier identification.

HEOR Generalist (Competency - % Relevance Score)



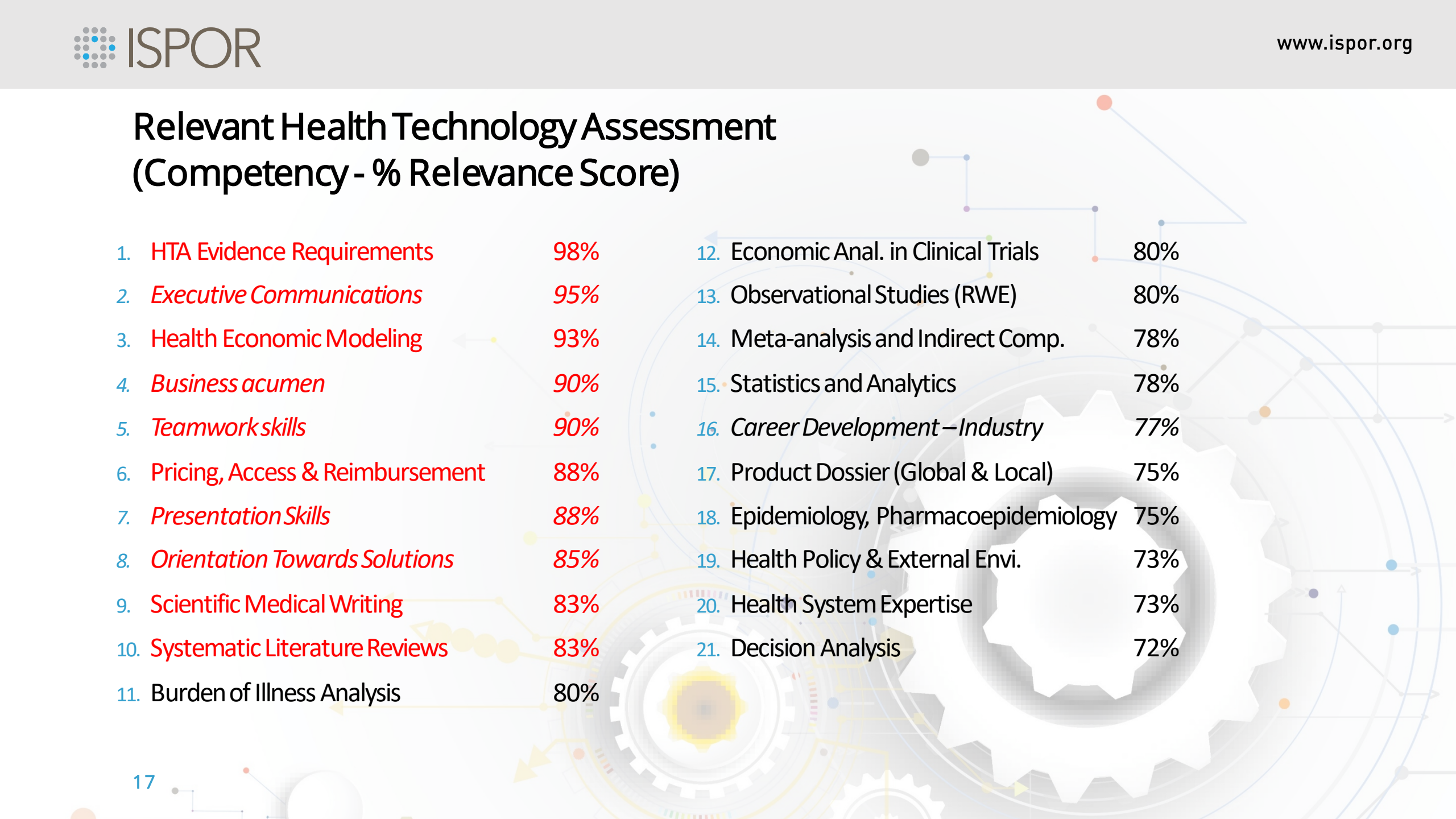
1.	<i>Teamwork (Dynamics, etc.)</i>	96%	13.	HTA Evidence Requirements	80%
2.	<i>Business acumen</i>	94%	14.	Economic Analysis in RCTs	79%
3.	<i>Presentation Skills</i>	92%	15.	<i>Customer Interactions</i>	77%
4.	<i>Observational Studies (RWE)</i>	91%	16.	Epidemiology	77%
5.	<i>Pricing, Access, and Reimbursement</i>	90%	17.	Product Dossier	77%
6.	<i>Scientific Medical Writing</i>	89%	18.	Health System Expertise	75%
7.	<i>Burden of Illness Analysis</i>	89%	19.	<i>Career Development - Industry,</i>	74%
8.	<i>Executive Communications</i>	88%	20.	Systematic Literature Reviews	73%
9.	<i>Orientation Towards Solutions</i>	86%	21.	<i>Assessment of Vendors</i>	73%
10.	<i>Retrospective Data Studies</i>	85%	22.	Meta-analysis & Indirect Comparison	71%
11.	Health Economic Modeling	84%			
12.	Statistics and Analytics	80%			

Health Economist (Competency - % Relevance Score)



1.	Health Economic Modeling	92%	11.	Systematic Literature Rev	80%
2.	HTA Evidence Requirements	90%	12.	Economic Analysis in RCTs	79%
3.	<i>Business acumen</i>	89%	13.	Decision Analysis	79%
4.	<i>Presentation Skills</i>	89%	14.	<i>Orientation Toward Solutions</i>	79%
5.	<i>Executive Communications</i>	89%	15.	Epidemiology	76%
6.	Scientific Medical Writing	86%	16.	Observational Studies (RWE)	75%
7.	<i>Teamwork Skills</i>	86%	17.	Meta-analysis & Indirect Comparison	74%
8.	HTA Evidence Requirements	84%	18.	Health System Expertise	72%
9.	Burden of Illness Analysis	84%	19.	Retrospective Data Studies	71%
10.	Statistics and Analytics	82%			

Relevant Health Technology Assessment (Competency - % Relevance Score)

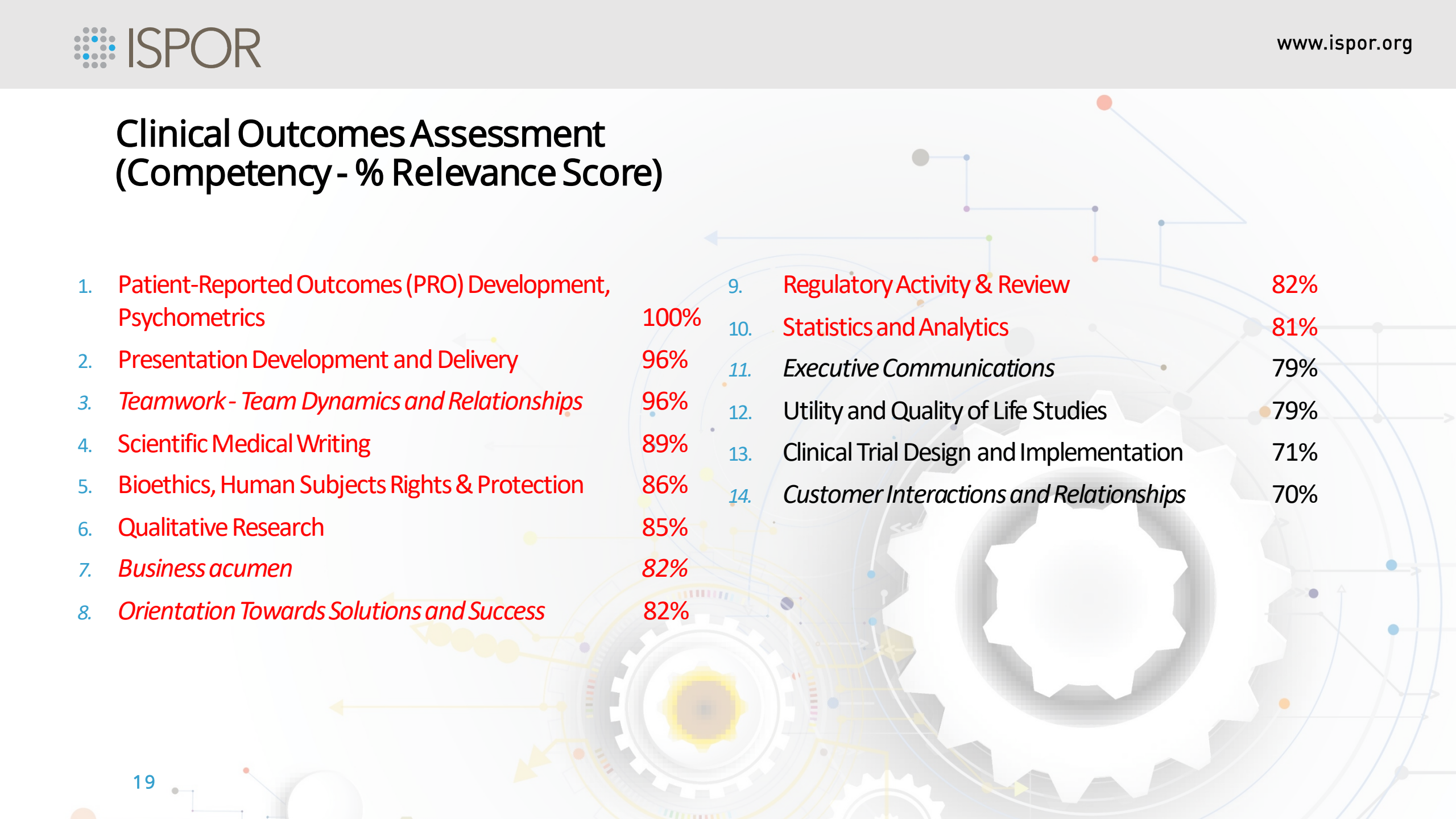


1. HTA Evidence Requirements	98%	12. Economic Anal. in Clinical Trials	80%
2. <i>Executive Communications</i>	95%	13. Observational Studies (RWE)	80%
3. Health Economic Modeling	93%	14. Meta-analysis and Indirect Comp.	78%
4. <i>Business acumen</i>	90%	15. Statistics and Analytics	78%
5. <i>Teamwork skills</i>	90%	16. <i>Career Development—Industry</i>	77%
6. Pricing, Access & Reimbursement	88%	17. Product Dossier (Global & Local)	75%
7. <i>Presentation Skills</i>	88%	18. Epidemiology, Pharmacoepidemiology	75%
8. <i>Orientation Towards Solutions</i>	85%	19. Health Policy & External Envi.	73%
9. Scientific Medical Writing	83%	20. Health System Expertise	73%
10. Systematic Literature Reviews	83%	21. Decision Analysis	72%
11. Burden of Illness Analysis	80%		

Real World Evidence and Observational Study Specialist Competencies (Competency - % Relevance Score)

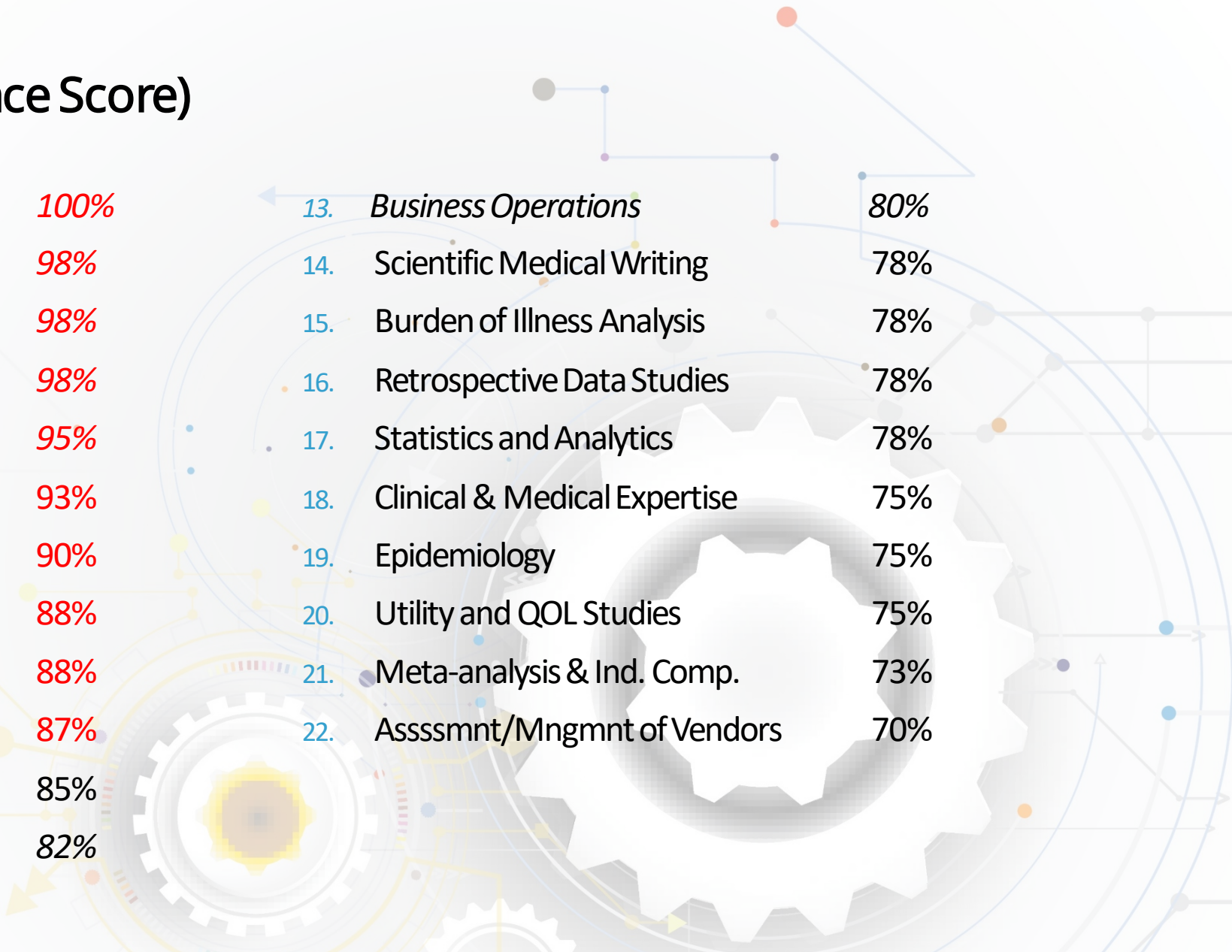
1.	Observational Studies (Real-World Evidence)	97%	11.	Executive Communications	74%
2.	<i>Business acumen</i>	94%	12.	Statistics and Analytics	74%
3.	<i>Teamwork - Team Dynamics and Relationships</i>	94%	13.	<i>Business Operations, Including Planning Process</i>	71%
4.	Retrospective Claims Database Studies	94%	14.	<i>Career Development – Industry</i>	71%
5.	Presentation Development and Delivery	89%	15.	Systematic Literature Reviews	71%
6.	Patient Registries	89%			
7.	<i>Orientation Towards Solutions and Success</i>	83%			
8.	Epidemiology, Pharmacoepidemiology Studies	80%			
9.	<i>Assessment and Management of Vendors</i>	74%			
10.	Scientific Medical Writing	74%			

Clinical Outcomes Assessment (Competency - % Relevance Score)



1. Patient-Reported Outcomes (PRO) Development, Psychometrics	100%	9. Regulatory Activity & Review	82%
2. Presentation Development and Delivery	96%	10. Statistics and Analytics	81%
3. <i>Teamwork - Team Dynamics and Relationships</i>	96%	11. <i>Executive Communications</i>	79%
4. Scientific Medical Writing	89%	12. Utility and Quality of Life Studies	79%
5. Bioethics, Human Subjects Rights & Protection	86%	13. Clinical Trial Design and Implementation	71%
6. Qualitative Research	85%	14. <i>Customer Interactions and Relationships</i>	70%
7. <i>Business acumen</i>	82%		
8. <i>Orientation Towards Solutions and Success</i>	82%		

HEOR Management (Competency - % Relevance Score)



1.	<i>Orientation Towards Success</i>	100%	13.	<i>Business Operations</i>	80%
2.	<i>Business acumen</i>	98%	14.	Scientific Medical Writing	78%
3.	<i>Executive Communications</i>	98%	15.	Burden of Illness Analysis	78%
4.	<i>Teamwork (dynamics, etc.)</i>	98%	16.	Retrospective Data Studies	78%
5.	<i>Presentation Skills</i>	95%	17.	Statistics and Analytics	78%
6.	<i>Customer Interactions</i>	93%	18.	Clinical & Medical Expertise	75%
7.	Pricing, Access, & Reimbursement	90%	19.	Epidemiology	75%
8.	Health Economic Modeling	88%	20.	Utility and QOL Studies	75%
9.	HTA Evidence Requirements	88%	21.	Meta-analysis & Ind. Comp.	73%
10.	Health System Expertise	87%	22.	Assessment/Management of Vendors	70%
11.	RWE & Observational Studies	85%			
12.	Career Development-Industry	82%			

Competencies in the “Top 10” for a Role are marked in **Red**

Softer Skills are in Italics and highlighted in **Yellow**

* = Competencies that were less than 70% relevant for that career track.

Competency (% scored as Very or Critically Relevant)	HTA	Health Econ (9)	RWE	PROs COA (7)	HEOR Gnrlist	HEOR Mgmt
<i>Assessment and Management of Vendors</i>	*	*	74%	*	73%	70%
Burden of Illness Analysis	80%	84%	*	*	89%	78%
<i>Business acumen</i>	90%	89%	94%	82%	94%	98%
<i>Customer Interactions and Relationships</i>	*	*	*	70%	77%	93%
Epidemiology, Including Pharmacoepidemiology Studies	75%	76%	80%	*	77%	75%
<i>Executive Communications</i>	95%	89%	74%	79%	88%	98%
Health Economic Modeling	93%	92%	*	*	84%	88%
Health System Expertise (Regional and Affiliate Level) at the Payer Level	73%	72%	*	*	75%	87%
Health Technology Assessment (HTA)	98%	90%	*	*	80%	88%
<i>Orientation Towards Solutions and Success</i>	85%	79%	83%	82%	76%	100%
Patient Registries, Including Risk Evaluation Monitoring Studies	*	*	89%	*	*	*
<i>Presentation Development and Delivery</i>	88%	89%	89%	*	92%	95%
Pricing Reimbursement and Access	88%	84%	*	96%	90%	90%
Patient Reported Outcomes	*	*	*	100%	*	*
Prospective and Retrospective Observational Studies (Real-World Evidence)	80%	75%	94%	*	91%	85%
Retrospective Claims Database Studies	*	71%	94%	*	85%	78%
<i>Scientific Medical Writing</i>	83%	86%	74%	89%	89%	78%
Statistics and Analytics	78%	82%	74%	81%	80%	*
Systematic Literature Reviews	83%	80%	71%	*	73%	*
<i>Teamwork - Team Dynamics and Relationships</i>	90%	86%	94%	96%	96%	98%
Utility and Quality of Life Studies	*	*	*	79%	*	*

3

Methodological and Statistical Research: Statistics and Analytics

Statistics and analytics competency: General Member Survey

- **Importance** is how necessary it is to have a competency within the overall HEOR discipline. Importance was rated by a 5-point scale where only “Important” or “Critically important” responses were counted.
- **Relevance** of each competency to the specific HEOR role held by the respondent. Relevance was rated by a 5-point scale for how relevant the competency is to a respondent’s current role. Again, only “Very Relevant” and “Relevant” response were counted.

Statistics and analytics competency – General Member Survey

- ‘Statistics and Analytics’ was listed as a ‘Top 10’ competency by Importance
- 93% of respondents to the general member survey identified this competency as “Important”
- 76% of respondents identified this competency as “Relevant”

Statistics and analytics competency – Relevance

- Variation across HEOR job types
- Summary results: % (ranking)
 - Health economist: 82% (#10)
 - Clinical outcomes assessment: 81% (#10)
 - RWE and observational study specialist: 74% (#10)
 - HEOR generalist: 80% (#12)
 - HTA practitioners: 78% (#15)
 - HEOR management: 78% (#16)

Statistics and analytics competency – Faculty Survey

- ‘Statistics and Analytics’ was covered in multiple ways: % (range)
 - Course work: 84% (47%-84%)
 - Research experience: 43% (19%-47%)
 - Advisement and mentorship: 29% (13%-47%)
- The coverage of this competency aligned with the Important ranking

Team members

- Research team:
 - Eberechukwu Onukwugha, PhD, Associate Professor, University of Maryland
 - Laura Pizzi, PharmD, Associate Chief Science Officer, ISPOR
 - James Murray PhD, Research Fellow, Eli Lilly and Company
 - Tsung-Ying Lee, PhD student, University of Maryland
 - Adaeze Amaefule, PharmD student, University of Maryland
- Advisors:
 - Doug Faries, PhD
 - Helene Karcher, PhD

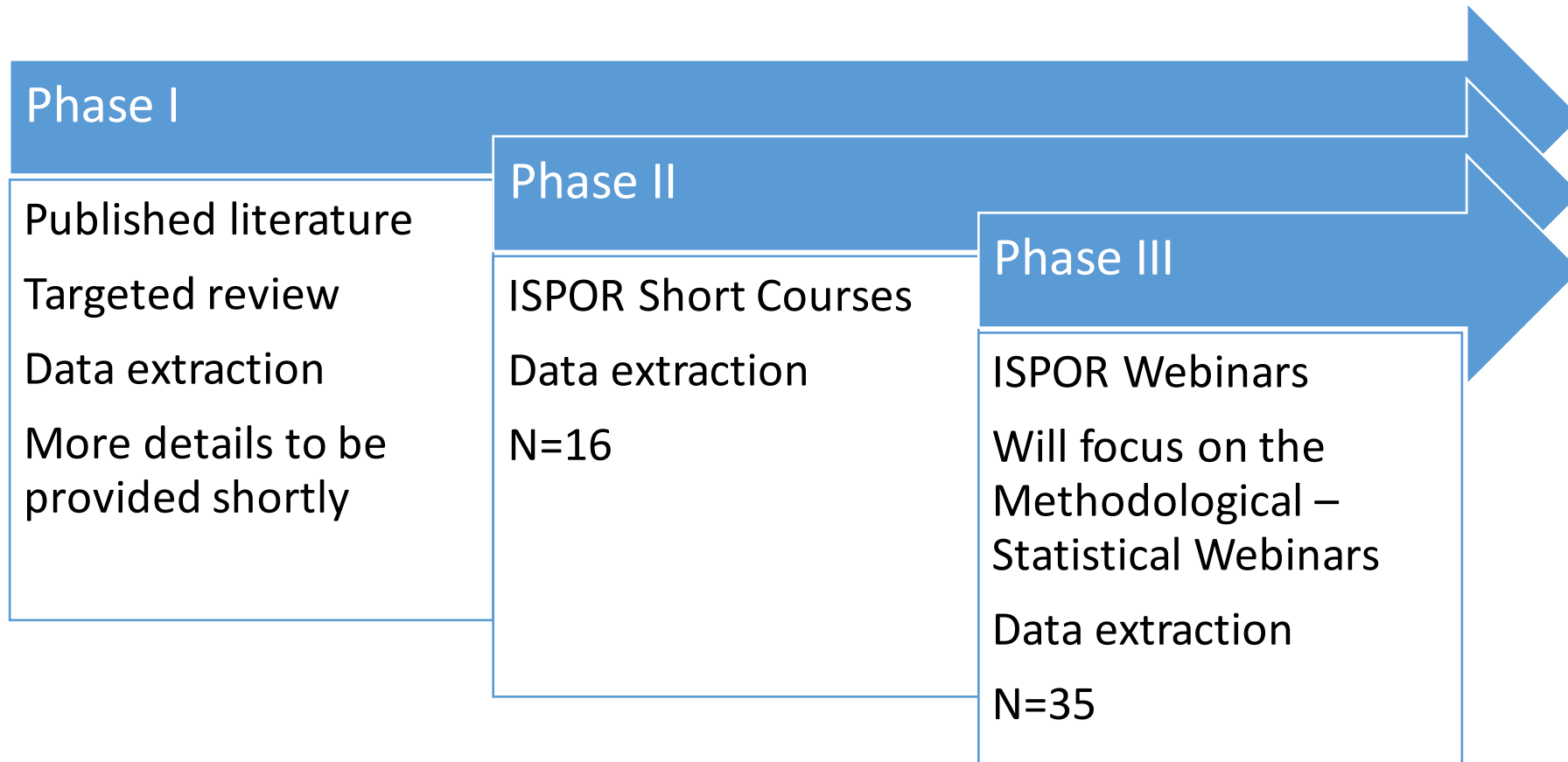
Statistics and Analytics: Subtopics

- Study design
- Regression models
- ETL: Extract, Transform, Load
- Data
- Statistical inference
- Cluster analysis/ML/AI methods
- Prediction models
- Statistical programs
- Emerging interfaces
- Risk-adjustment methods

Statistics and Analytics: Project objectives

- Develop topic areas to guide curriculum development
- Identify professional development, training, and educational resources using published literature, online training materials, and video content.
- Characterize gaps in professional development, training, and educational resources

Process

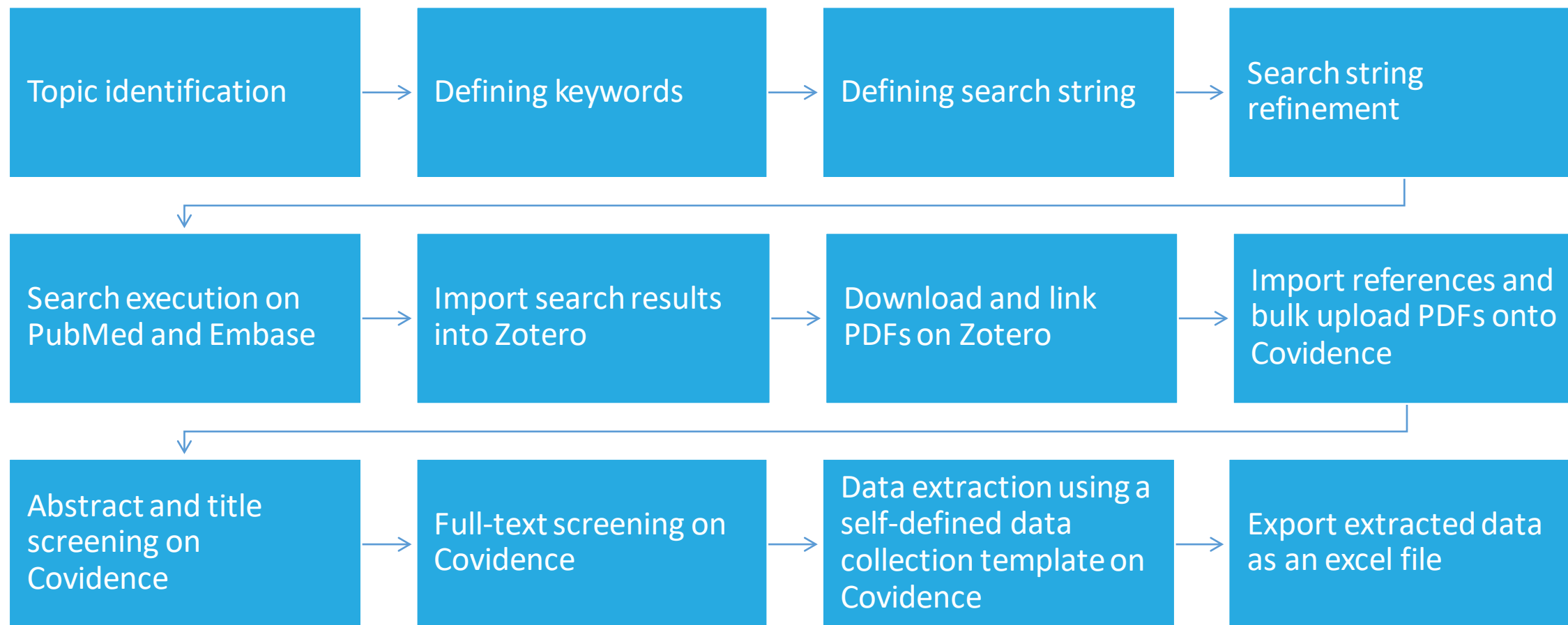


SECTION

4

Process Overview and Project Status: Published Literature Review

Workflow for Published Literature Review



Search Process for Published Literature Review

- A literature review was initiated in PubMed and Embase on Aug 24, 2021
 - Search between 2000-2020
 - Apply criteria of 'Humans' and 'English'
 - Search from selected journals
 - Use the Medical Subject Heading (MeSH) search terms: 'methods', 'statistics as topic/methods', 'statistics as topic', or 'methods/statistics and numerical data'
 - Search titles and abstracts for the combinations of identified topic keywords

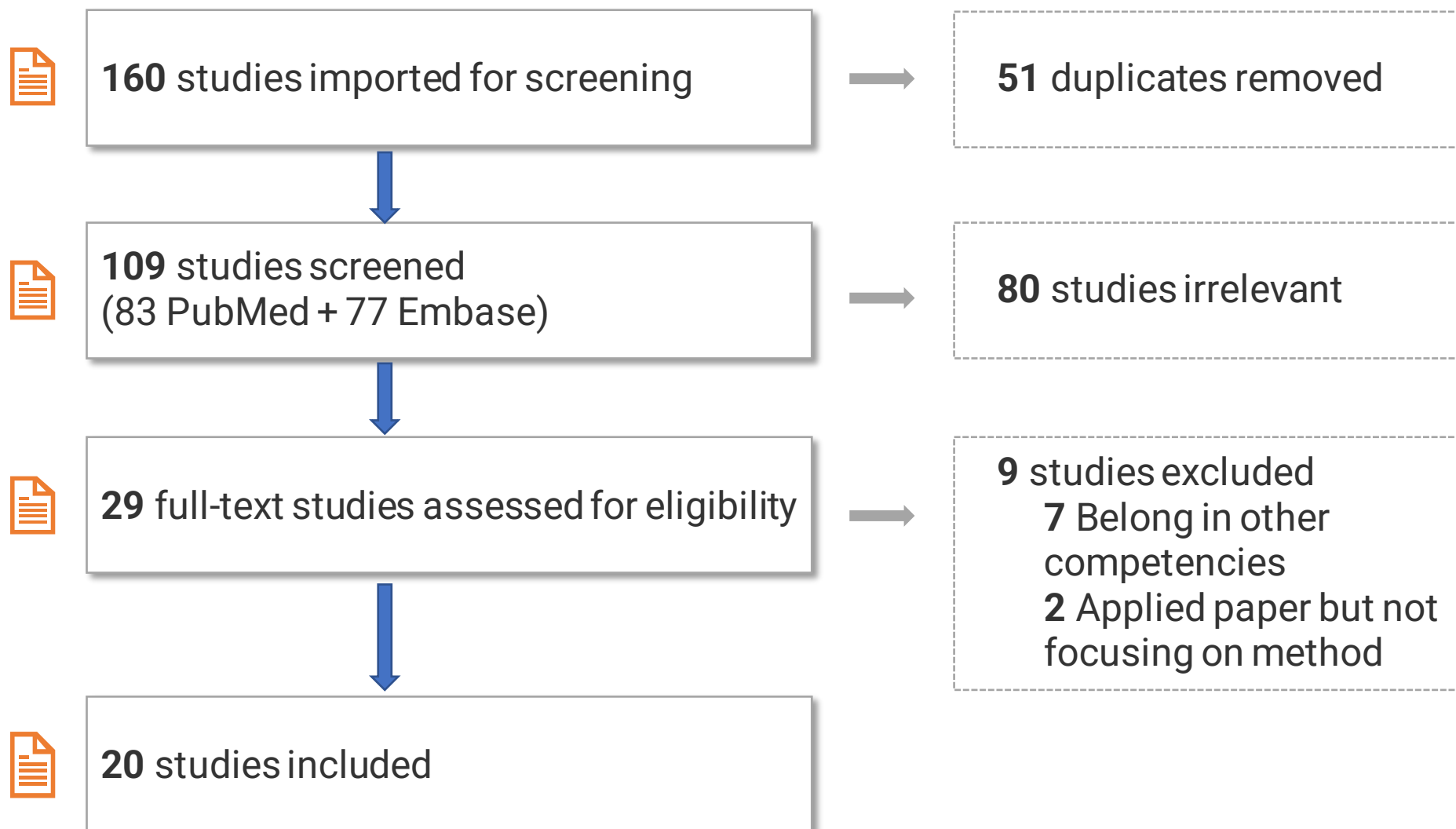
Selected Journals

- Value in Health
- Pharmacoeconomics
- American Journal of Epidemiology
- Health Services Research
- Medical Decision Making
- Pharmacoepidemiology and Drug Safety
- Health Services Outcomes Research Methodology
- International Journal of Technology Assessment in Health Care

Search Terms for Title and Title/Abstract

- Title
 - Tutorial / Primer / Introduction / Guide / State of the Art
- Title/Abstract
 - Study design observational research
 - Regression
 - Statistical inference
 - Machine learning
 - Artificial intelligence
 - Prediction
 - Statistical programs
 - Risk adjustment
 - Survival
 - Mixed model
 - Marginal structural model
 - Count model
 - Propensity score
 - Disease risk score
 - Instrumental variable
 - Confounding
 - Bias
 - Specification
 - Repeated measures
 - Missing data
 - Imputation
 - Simulation
 - Calibration
 - Extrapolation
 - Data visualization
 - Bayes

Search Results for Published Literature Review



Data Extraction using Covidence

← Latimer 2013

Save Complete ?

Select Full Text ▾

Check for updates

ORIGINAL ARTICLES

Survival Analysis for Economic Evaluations Alongside Clinical Trials—Extrapolation with Patient-Level Data: Inconsistencies, Limitations, and a Practical Guide

Nicholas R. Latimer, MSc

Background. In health technology assessments (HTAs) of interventions that affect survival, it is essential to accurately estimate the survival benefit associated with the new treatment. Generally, trial data must be extrapolated, and many models are available for this purpose. The choice of extrapolation model is critical because different models can lead to very different cost-effectiveness results. A failure to systematically justify the chosen model creates the possibility of bias and inconsistency between HTAs. **Objective.** To demonstrate the limitations and inconsistencies associated with the survival analysis component of HTAs and to propose a process guide that will help exclude these from future analyses. **Methods.** We reviewed the survival analysis component of 45 HTAs undertaken for the National Institute for Health and Clinical Excellence (NICE) in the cancer disease area. We drew upon our findings to identify common limitations and to develop a process guide. **Results.** The chosen survival models were not systematically justified in any of the HTAs reviewed. The range of models considered was usually insufficient, and the rationale for the chosen model was universally limited; in particular, the plausibility of the extrapolated portion of fitted survival curves was very rarely explicitly considered. **Limitations.** We do not seek to describe and review all methods available for performing survival analysis—several approaches exist that are not mentioned in this article. Instead we seek to analyze methods commonly used in HTAs and limitations associated with their application. **Conclusions.** Survival analysis has not been conducted systematically in HTAs. A systematic approach such as the one proposed here is required to reduce the possibility of bias in cost-effectiveness results and inconsistency between technology assessments. **Key words:** oncology; cost-utility analysis; technology assessment; pharmacoeconomics; modeling; survival analysis; overall survival; resource allocation (*Med Decis Making* 2013;33:743–754)

Received 6 March 2012 from Health Economics and Decision Science, School of Health and Related Research, University of Sheffield (NFL). Presentations based upon this work have been given at the International Health Economics Association (IHEA) 8th World Congress in Toronto.

Interventions that affect survival or any other time-to-event outcome form a high proportion of the treatments appraised by health technology assessment (HTA) agencies. In these it is essential to accu-

DATA EXTRACTION

General information

PubMed ID

Abbreviated Reference
Enter in the format of: [Title]. [Journal].

Publication year

Characteristics of included studies

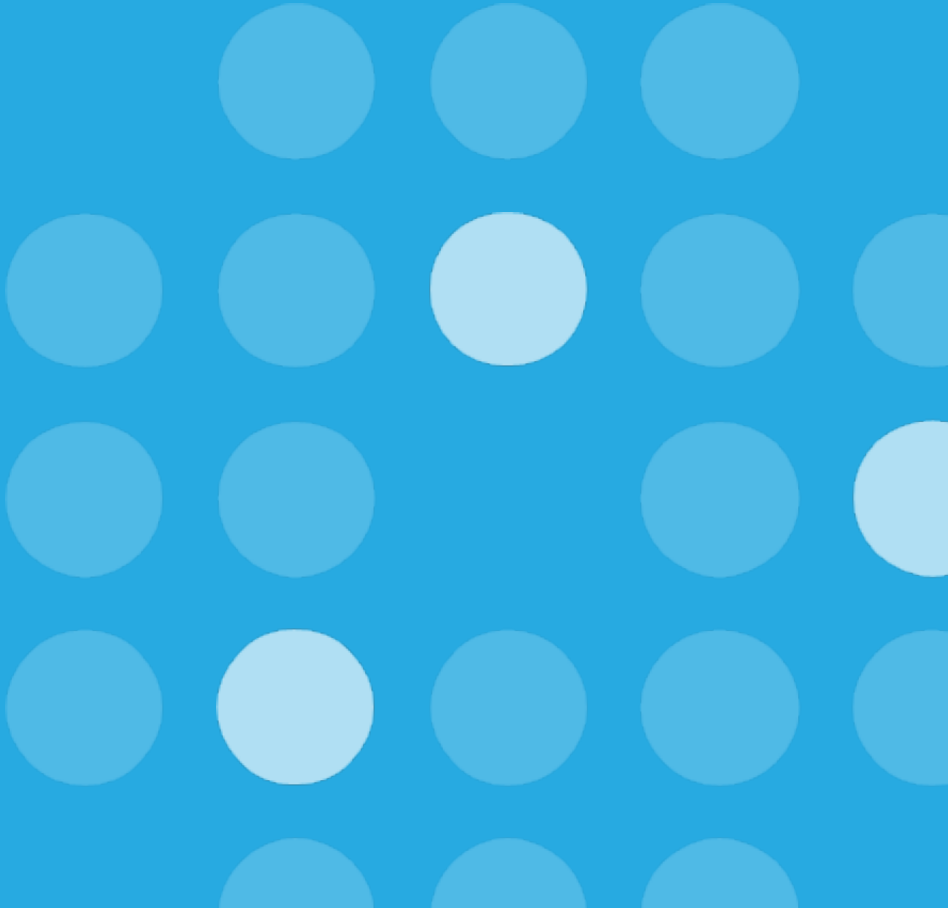
Statistical topic area: ☐ 1 Study design ☐ 2 Regression models ☐ 3 ETL ☐ 4 Data ☐ 5 Statistical inference ☐ 6 Big data methods (ML/AI) ☐ 7 Prediction models ☐ 8 Statistical programs

37

SECTION

5

Discussion



Audience discussion

- Within the 'Statistics and Analytics' domain, what types of training resources:
 - have you used in your work?
 - would be useful to you in your work?
- What would be the next competency category to address?



Appendix. Search strings used (PubMed)

2000/01/01:2020/12/31[Date - Publication] AND "english"[Language] AND "humans"[Filter] AND ("Value in Health the journal of the international society for pharmacoeconomics and outcomes research"[Journal] OR "PharmacoEconomics"[Journal] OR "American Journal of Epidemiology"[Journal] OR "Health Services Research"[Journal] OR "Medical Decision Making an international journal of the society for medical decision making"[Journal] OR "Pharmacoepidemiology and Drug Safety"[Journal] OR "Health Services Outcomes Research Methodology"[Journal] OR "Int J Technol Assess Health Care"[Journal])

AND ("tutorial"[Title] OR "primer"[Title] OR "introduction"[Title] OR "guide"[Title] OR "state of the art"[Title])

AND ("study design observational research"[Title/Abstract] OR "regression"[Title/Abstract] OR "statistical inference"[Title/Abstract] OR "machine learning"[Title/Abstract] OR "artificial intelligence"[Title/Abstract] OR "prediction"[Title/Abstract] OR "statistical programs"[Title/Abstract] OR "risk adjustment"[Title/Abstract] OR "survival"[Title/Abstract] OR "mixed model"[Title/Abstract] OR "marginal structural model"[Title/Abstract] OR "count model"[Title/Abstract] OR "propensity score"[Title/Abstract] OR "disease risk score"[Title/Abstract] OR "instrumental variable"[Title/Abstract] OR "confounding"[Title/Abstract] OR "bias"[Title/Abstract] OR "specification"[Title/Abstract] OR "repeated measures"[Title/Abstract] OR "missing data"[Title/Abstract] OR "imputation"[Title/Abstract] OR "simulation"[Title/Abstract] OR "calibration"[Title/Abstract] OR "extrapolation"[Title/Abstract] OR "data visualization"[Title/Abstract] OR "Bayes"[Title/Abstract] OR "methods"[MeSH Terms] OR "statistics as topic/methods"[MeSH Terms] OR "statistics as topic"[MeSH Terms] OR "methods/statistics and numerical data"[MeSH Terms])

Appendix. Search strings used (Embase)

[2000-2020]/py AND [english]/lim AND [humans]/lim AND ([article]/lim OR [article in press]/lim OR [editorial]/lim OR [review]/lim) AND ('Value in Health'/jt OR PharmacoEconomics/jt OR 'American Journal of Epidemiology'/jt OR 'Health Services Research'/jt OR 'Medical Decision Making : an international journal of the society for medical decision making'/jt OR 'Pharmacoepidemiology and Drug Safety'/jt OR 'Health Services and Outcomes Research Methodology'/jt OR 'International Journal of Technology Assessment in Health Care'/jt) AND ('tutorial':ti OR 'primer':ti OR 'introduction':ti OR 'guide':ti OR 'state of the art':ti) AND ('study design observational research':ti,ab OR 'regression':ti,ab OR 'statistical inference':ti,ab OR 'machine learning':ti,ab OR 'artificial intelligence':ti,ab OR 'prediction':ti,ab OR 'statistical programs':ti,ab OR 'risk adjustment':ti,ab OR 'survival':ti,ab OR 'mixed model':ti,ab OR 'marginal structural model':ti,ab OR 'count model':ti,ab OR 'propensity score':ti,ab OR 'disease risk score':ti,ab OR 'instrumental variable':ti,ab OR 'confounding':ti,ab OR 'bias':ti,ab OR 'specification':ti,ab OR 'repeated measures':ti,ab OR 'missing data':ti,ab OR 'imputation':ti,ab OR 'simulation':ti,ab OR 'calibration':ti,ab OR 'extrapolation':ti,ab OR 'data visualization':ti,ab OR 'Bayes':ti,ab OR 'methodology'/exp OR 'methodological studies'/exp OR 'statistical concepts'/exp OR 'statistics'/exp)