

# Risk-Benefit Analysis: Pharmacoepidemiology and Preference Measurement Used for Decision-Making

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Training Session Objectives: To provide an understanding of (1) the state of the science in risk-benefit analysis; (2) advantages and disadvantages of different approaches to risk-benefit analysis; and (3) an evaluation of how stated-preference (SP) methods can be used to quantify risk-benefit tradeoffs to help inform regulatory and clinical decision-making.

Background: Regulators, clinicians, and patients routinely make decisions that require trading safety for desired clinical benefits in the absence of directly comparable metrics. Economists and epidemiologists recently have developed quantitative methods for systematically evaluating the risks and benefits of new or existing medical interventions. These methods evaluate risk-benefit tradeoffs to assist regulatory and clinical decision-making. Alternative approaches include comparing un-weighted risk and benefit incidence rates without considering decision makers' willingness to trade off risks and benefits; comparing weighted risk and benefit incidence rates, where each outcome is assigned a relative importance or preference weight; and comparing actual risk exposures with maximum acceptable risks using decision makers' stated willingness to accept risk to achieve specified therapeutic benefits.

Training Session Description: The instructors will present a detailed overview of methods for risk-benefit evaluation, the advantages and disadvantages of each method, and potential use of each method in risk management. In addition, the training session will provide a detailed tutorial on choice-format conjoint methods (sometimes called discrete-choice experiments) to directly elicit and quantify patient and physician risk-benefit tradeoffs. Participants will complete an actual survey and participate in a debriefing on decision-making heuristics subjects may employ in completing tradeoff tasks. Specific topics will include a) defining relevant and realistic treatment attributes to describe alternatives in the tradeoff tasks, b) overcoming innumeracy and cognitive problems related to communicating probability concepts c) devising internal validity tests to ensure that subjects successfully completed tradeoff tasks involving probabilistic outcomes, d) balancing statistical error and potential measurement error resulting from cognitive limitations, e) using appropriate statistical analysis of cross-section/time-series choice data, and f) deriving and interpreting maximum acceptable risk estimates, including comparing conjoint measures and standard-gamble measures of risk tolerance. Recent empirical studies in hormone replacement, Crohn's disease, multiple sclerosis, osteoarthritis, and irritable bowel syndrome will be used to illustrate key elements of risk-benefit tradeoff methods. The instructors will lead a group discussion on the relevance and acceptability of these methods and specific results in regulatory and clinical decision-making.