Proposal for a Scientific Working Group (SWG) under the ASA Biopharmaceutical Section

1. Proposer Information

The proposal is submitted by Fei Chen, Senior Director Biostatistics, Johnson & Johnson Innovative Medicine, and Bohdana Ratitch, Senior Director Expert Statistician, Bayer Statistical Innovation, with joint expertise in clinical trial design, statistical methodologies, machine learning, and experience with clinical trial operations and interactions with functions responsible for them.

2. Topic and Primary Goal

Topic: Enhancing Operational Efficiency in Clinical Trials through Statistical Innovation and Cross-functional Collaborative Research

Primary Goal: To identify, evaluate, develop, and promote statistical methods and operational strategies to improve the efficiency of clinical trial execution, focusing on clinical study operational areas such as trial feasibility assessment, site selection and performance evaluation, patient recruitment planning and tracking, and clinical drug supply. The working group will explore innovative analytical methodologies at the intersection of several fields, including Bayesian modeling, Data Science and AI/ML, clinical trial simulation, and data visualization, leveraging real-world and clinical trial data to maximize operational efficiency and excellence. By creating a collaborative platform for statisticians, clinical operational experts, and regulators, the initiative aims to facilitate the exchange of insights, experiences, and best practices, ultimately optimizing clinical trial processes and outcomes.

3. Importance of the Topic

Operational inefficiencies in clinical trials significantly delay drug development, increase costs, and ultimately limit patient access to novel treatments. Addressing these challenges has the potential to:

- Accelerate timelines for availability of life-saving treatments.
- Enhance the quality and integrity of trial data.
- Reduce burdens on patients and investigators.
- Improve generalizability of clinical trial results.
- Lower development costs, benefiting healthcare systems and patients.

By participating in this SWG, industry experts in collaboration with other quantitative scientists from academia can help shape solutions that are innovative, practical, and align with best interests of clinical researchers, patients, and other healthcare stakeholders

4. Relevance to ASA Biopharmaceutical Section Sponsorship

This topic aligns with the Section's focus on advancing pharmaceutical statistics and improving healthcare by:

- Promoting innovative statistical and analytical methodologies for operational efficiency in biopharmaceutical research and development, with a focus on under-researched topics.
- Enabling the use of quantitative and data-driven approaches in all aspects of clinical development.
- Facilitating interdisciplinary collaboration among statisticians, clinical scientists, clinical operations experts, and data scientists.

We believe that the topic's translational nature—bridging statistical methods with practical trial execution—makes it a prime candidate for sponsorship.

5. Current Landscape of Related Efforts

To the best of our knowledge, no other SWGs specifically address operational efficiency in clinical trials within the ASA Biopharmaceutical Section umbrella. However, there are existing SWGs that focus on related themes, which can provide valuable insights and complementary expertise. The following groups are relevant:

- Centralized Statistical Monitoring and Quality Tolerance Limit SWG: A Quality Tolerance Limit (QTL) is a statistical threshold set during the design of a clinical trial and defines the acceptable range of variability for key quality metrics that are critical to the integrity and reliability of the trial data. QTLs are established based on pre-defined statistical criteria and are used to monitor various aspects of trial execution, such as participant compliance, data reporting accuracy, site performance, and other metrics related to trial quality and as such provide a perspective by which the efficiency of trial operations can be assessed. For instance, if a site is frequently violating its QTLs, it may indicate underlying inefficiencies in site management, patient recruitment, or data handling that need to be addressed; if certain sites consistently reach their QTLs and perform well, resources such as support staff or funding can be reallocated from underperforming sites to maximize overall trial efficiency; when trial teams are aware of quality metrics, they are more likely to implement practices that enhance operational efficiency while maintaining the integrity of the trial. By analyzing QTL violations, trial teams can identify specific areas of operational inefficiency and work to optimize processes. Our SWG can collaborate with this group to develop robust methodologies for site performance monitoring and data assessment. Joint efforts could lead to innovative approaches that integrate quality monitoring with operational efficiency, allowing for improved decision-making processes in trial management.
- AI/ML SWG: This group focuses on the application of artificial intelligence and machine learning techniques, which are critical for enhancing various operational aspects of clinical trials, such as predictive modeling for recruitment and site selection. Collaborating with the AI/ML SWG can help our working group leverage advanced analytical techniques to develop predictive models and innovative tools that streamline

trial operations. Joint workshops and webinars can facilitate knowledge sharing and drive the application of best methodologies to improve trial efficiency.

- Software Engineering SWG: This group is concerned with software development processes and tools used in biostatistics and clinical research, which can significantly impact the efficiency of trial execution through better data management and analytical capabilities. Our SWG can engage with the Software Engineering SWG to identify best practices in software development that can enhance data processes in clinical trials.
- Bayesian SWG: The Bayesian SWG specializes in Bayesian statistical methodologies, which are critical in trial design and data analysis, particularly in dynamic and adaptive trial frameworks. Collaborative research initiatives can be established to evaluate how Bayesian approaches can improve decision-making in site selection, patient recruitment, and data evaluation processes. A key focus of area of collaboration is on the topic of program-level decision-making. Bayesian statistics offer an effective framework that enables cross-functional teams—including clinical operations, regulatory affairs, biostatistics, and quality assurance—to integrate diverse data sources into a cohesive quantitative model. This unified approach facilitates informed decision-making, ultimately enhancing operational efficiency across the development process.

By proactively engaging with these existing SWGs, our proposed SWG can ensure that we build on established frameworks and insights, fostering a strong collaborative environment that benefits all parties involved. These collaborations will help avoid redundancy, leverage complementary expertise, and enrich the discussions surrounding operational efficiencies in clinical trials.

6. Potential Topics for the Working Group

The working group will focus on developing and evaluating strategies and methodological innovations for improving operational efficiencies in clinical trials. Areas that can potentially benefit from the SWG work are listed below.

- **Site Selection and Performance Assessment**: Use data-driven approaches to model site performance in a holistic manner (including patient screening efficiency, recruitment, retention, and compliance); inform site selection using such predictive models while incorporating uncertainty into decision-making; enhance understanding of clinical site characteristics that are informative for decision-making overall trial efficiencies. An important focus area is to take into account the complexities of global regulatory environments through evaluating regulatory requirements, compliance standards, and the potential for expedited approval processes in various jurisdictions. By analyzing historical data related to regulatory performance, understanding regional trial practices, and identifying collaborative opportunities with local regulatory bodies, the SWG aims to provide strategies to ensure that chosen locations not only have access to the target patient populations but also align with the regulatory expectations of the regions involved.
- **Ensuring Representativeness of the Trial Population**: Strategies to enhance the diversity and generalizability of clinical trial populations to ensure representative study outcomes, including a global perspective in multi-regional clinical trials.

- **Recruitment Monitoring and Forecasting:** Identify and promote best practices, methodologies, and tools for near real-time monitoring of participant recruitment and site performance in order to enable agile execution of operational strategies.
- **Clinical Drug Supply Optimization**: Use just-in-time supply models to optimize inventory levels and incorporate predictive analytics to forecast supply needs accurately.
- **Strategic Data Collection and Analysis Planning:** Identify data types and sources as well as types of analyses that could support holistic insights for the representative patient population and alignment with the Target Product Profile. Consider the evolving role of real-world data in all aspects of clinical development planning and execution**.**
- **Patient Engagement in Design and Conduct of Clinical Trials**: Identify best practices for incorporating the evaluation of satisfaction and experience of participants in clinical trials into operational planning, including site selection and performance assessment.
- **Challenges and Opportunities in Non-traditional Clinical Trial Settings**: Identify key aspects of emerging clinical trial settings, such as Decentralized Clinical Trials (DCTs) and Pragmatic Clinical Trials (PCTs), with important impact on operational efficiency, site performance, and participant recruitment, and provide recommendations on incorporating the relevant considerations in the clinical operations strategy.
- **Programming:** Investigate approaches to enhance operational efficiency in programming and statistical analysis. This includes streamlining coding processes, improving software infrastructure, utilizing automated tools for data processing, and ensuring reproducibility of analysis results.

From the statistical and analytics point of view, this work will rely on expertise from several domains, including:

- Bayesian modeling
- Predictive modeling, including AI/ML
- Clinical trial simulations
- Data visualization
- Data science and software tools development
- Clinical drug supply optimization

The final scope will be determined in collaboration with the SWG members.

7. Estimated Membership and Expertise

Initial Membership: Estimated 10-15 members, including:

- Statisticians
- Clinical operations professionals
- Data scientists

8. Anticipated Timeline

The group will achieve its goals over a 2-3 year period, with the following milestones:

- **Year 1**: Literature review, identification of key inefficiencies, summary of existing methodologies and tools, and proposals for methodological improvements.
- **Year 2**: Development and application of methodologies, case studies, and development of recommendations.
- **Year 3**: Publish findings, conference presentations and promote best practices across industry

9. Financial Support Needs

No immediate financial support is requested or anticipated to be needed from the Biopharmaceutical Section.

10. Communication and Dissemination

The SWG will promote its efforts and accomplishments through:

- White papers, journal articles and case studies
- Presentations at ASA conferences and workshops.
- Webinars and workshops.
- Online forums, newsletters, and social media channels.

Conclusion

This SWG will serve as a catalyst for advancing operational efficiency in clinical trials through statistical innovation and cross-disciplinary collaboration. By addressing critical gaps in trial execution, the group will contribute to faster, safer, and more cost-effective drug development, ultimately benefiting patients, sponsors, and other stakeholders in the healthcare ecosystem alike. The ASA Biopharmaceutical Section's sponsorship will ensure the initiative has the credibility, expertise, and reach needed to make a meaningful impact.