Self-Reflection on the Research Proposal: *Machine Learning Approaches to Assess Long-term Inclisiran Safety*

Developing this research proposal was an opportunity to synthesise insights from my academic and professional journey, encompassing medical training (MD), doctoral research in health data science (PhD), and my current role as a data scientist in the pharmaceutical industry. Having previously designed research protocols and written competitive academic grants, I approached this task with a focus on methodological rigour, translational relevance, and practical feasibility within regulated healthcare environments. The experience reinforced how multidisciplinary perspectives are essential when designing research at the intersection of clinical science and artificial intelligence (AI). I have structured my reflection below in line with the instructions and grading criteria.

Knowledge and understanding

My medical background provided a clinical foundation for identifying a meaningful research problem: assessing the long-term safety of inclisiran, a novel small interfering RNA (siRNA) therapy. Reviewing cardiovascular and pharmacovigilance literature clarified that while inclisiran's efficacy is well established, long-term safety signals remain insufficiently characterised. Drawing on my experience in trial design and data monitoring, I recognised how ML could augment conventional statistical approaches by integrating structured and unstructured trial data. My PhD training in health data science allowed me to conceptualise this as an applied problem in multimodal data integration, where electronic health records, free-text notes, and registry linkages can provide complementary perspectives on safety.

Critical engagement with literature and methodology

Having previously conducted systematic literature reviews and designed data-intensive research projects, I was intentional in selecting high-quality, recent, and peer-reviewed sources. Trials such as ORION-9 to ORION-11 (Ray et al., 2020) and pooled analyses (Wright et al., 2023) established the clinical context, while contemporary ML reviews (Kim et al., 2022; Hu et al., 2023; Murphy et al., 2023) provided methodological grounding. I critically assessed the limitations of each, recognising for example the tendency for ML models to prioritise predictive accuracy over interpretability, a challenge I addressed by incorporating explainable AI tools such as SHAP. The decision to benchmark ML against Cox regression and disproportionality analyses reflected a pragmatic understanding of the regulatory expectations for model transparency and validation.

Ethical, regulatory, and practical considerations

My professional experience in the pharmaceutical sector made me particularly aware of data protection, reproducibility, and algorithmic fairness. I therefore integrated GDPR-compliant pseudonymisation, secure data storage, and fairness auditing into the proposal. Recognising the potential for bias in under-represented subgroups, I proposed expert clinical review of any detected signals, blending automated discovery with human oversight. This hybrid governance model aligns with current regulatory principles for trustworthy AI in healthcare and reflects lessons from prior grant and ethics submissions I have authored.

Structure, presentation, and communication

Preparing a 15-minute narrated presentation demanded clarity, concision, and accessibility. My prior experience pitching research funding proposals helped me frame the narrative around impact and feasibility. I focused on visual storytelling (including timelines, flowcharts, and

summary graphics) to communicate complex ideas intuitively while maintaining scientific precision. This strengthened my ability to articulate computational research to interdisciplinary audiences of clinicians, data scientists, and regulators.

Personal and professional development

This exercise reaffirmed the value of integrating medical, computational, and ethical perspectives when designing impactful research. It also reminded me that methodological sophistication must always serve clinical relevance and patient safety. The process reinforced my confidence in leading translational research that bridges clinical trials, AI innovation, and regulatory science, a direction I intend to continue pursuing through future collaborations and grant-funded projects.