

Project Proposal for IHI Partnership: AI-Driven Pharmacovigilance for Geriatric Polypharmacy Management

1. Project Title

Pharmalysis: An AI-Powered Decision Support Ecosystem for Preventing Medication-Related Harm in Multi-Morbid Geriatric Populations.

2. Executive Summary

Medication-related harm is a leading cause of avoidable morbidity and mortality globally, with at least 1 in 20 patients affected. The burden is particularly high among geriatric patients suffering from multi-morbidity and polypharmacy (the use of 5 or more medications).

Pharmalysis aims to address this by deploying advanced Artificial Intelligence (AI) and Natural Language Processing (NLP) to provide real-time risk assessment for drug-drug, drug-food, and drug-supplement interactions. We are seeking partners from academia, healthcare providers, and the pharmaceutical industry to pilot and scale this solution within the IHI framework.

3. Problem Statement & Rationale

- **The Global Burden:** Approximately 25% of preventable medication-related harm is considered severe or life-threatening.
- **The Vulnerability of the Elderly:** Geriatric care units experience the highest prevalence of preventable medication harm at 17%. This is often due to complex medication regimens required for multiple long-term conditions.
- **Systemic Weaknesses:** About 53% of preventable harm occurs at the ordering/prescribing stage. Traditional manual pharmacovigilance (PV) is increasingly strained by the volume and complexity of data, leading to a "reactive" rather than "proactive" safety culture.

4. Objectives

Aligning with the **WHO Global Patient Safety Challenge: Medication Without Harm**, our project seeks to:

- Reduce severe, avoidable medication-related harm by providing clinicians and pharmacists with AI-driven decision support.
- Automate the detection of adverse drug reactions (ADRs) and interactions in unstructured clinical data using NLP.
- Empower geriatric patients and caregivers through personalized medication safety insights, improving adherence and health literacy.

5. Proposed Solution: Pharmalysis

Our product, **Pharmalysis**, acts as a proactive "radar" for drug safety. Key features include:

- **Real-time Interaction Monitoring:** Using Machine Learning (ML) to analyze risks between prescriptions and a patient's concurrent use of food, supplements, and other OTC drugs.
- **Automated Case Triage:** Streamlining case processing by auto-extracting data and prioritizing high-risk situations for human review.
- **Predictive Pharmacovigilance:** Moving from a reactive to a predictive model that anticipates risks before they manifest as serious signals.

6. Expected Impact

- **Clinical:** Reduction in hospital visits (estimated 16%) and emergency department visits (estimated 47%) through comprehensive medication reviews.
- **Economic:** Potential global health expenditure savings of up to US\$ 18 billion through appropriate polypharmacy management.
- **Operational:** Automation of up to 70% of routine pharmacovigilance tasks, allowing specialists to focus on high-value medical assessments.

7. Partnering Needs

We are looking for partners to join our consortium:

- **Clinical Partners (Hospitals/Care Homes):** To pilot Pharmalysis in real-world geriatric settings and provide feedback on clinical workflows.
- **IT & Data Science Experts:** To enhance AI model transparency, prevent algorithmic bias, and ensure integration with existing safety databases like EudraVigilance.
- **Pharmaceutical Companies:** To collaborate on signal detection and post-market surveillance for complex product portfolios.
- **Patient Organizations:** To ensure a people-centered approach and incorporate patient-reported outcomes into the safety loop