LLM-guided normalization **resolved 99.5% of Hungarian free-text drug entries into structured English language query strings**, with subsequent OMOP vocabulary lookup achieving an F1 of 0.71 — exploring the possibility of automated CDM conversion of free-text non-English drug data for future research.

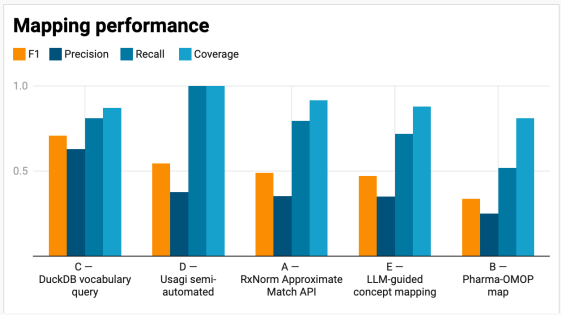
LLM-Guided Drug Normalization for Rapid OMOP CDM Integration of Hungarian Drug Data

Background: Real-world evidence research depends on standardized clinical data, yet medication records in Hungarian hospitals are documented in heterogeneous free-text formats — brand names, local abbreviations, and unstructured dosing — with no controlled vocabulary enforced at point of entry. Mapping this data to OMOP CDM is a technical prerequisite for real world evidence research, but it remains a demanding, multi-step challenge for which rule-based approaches have historically fallen short. The rapid maturation of large language models make it timely to evaluate whether these emerging technologies can close that gap.

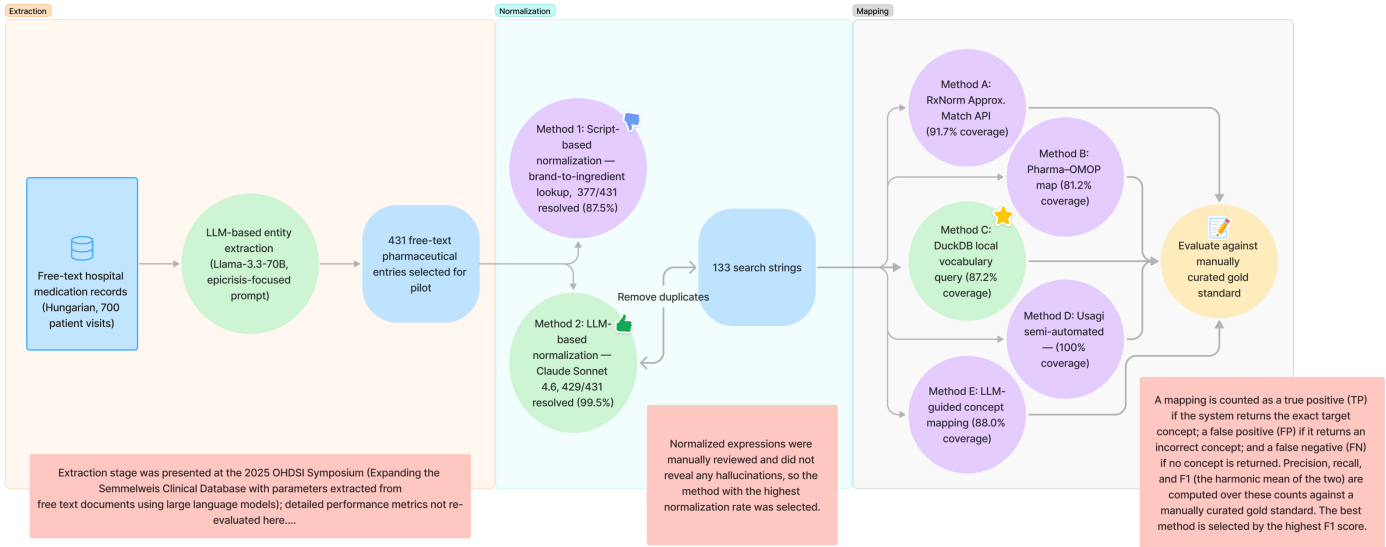
Result 1: Comparison of script based and LLM based normalization.

Evaluation criteria	Script based normalization	LLM based normalization
Development effort	High upfront	Low
Maintenance	Requires frequent updates,	More robust to change, just prompt fine-tuning
Interpretability	Fully explicit, interpretable rule set	Black-box, harder to justify
Risks	Misses instead of errors	Hallucinations – not detected
Costs	Low runtime cost	Model dependent, can be high
Normalized medications (total 431)	377 (87.5%)	429 (99.5%)

Result 2: Evaluating the mapping performance of 5 different methods



Methods



Limitations: This study is exploratory, using binary classification metrics that do not reward ranked or partially correct mappings. The dataset is limited to a single source with a diabetic profile covering Hungarian pharmaceuticals, restricting generalizability, and runtime API dependencies prevent high-volume production deployment and scalability.

Orsolya Bali [1], Loretta Kiss [1], Eszter Kővári [1], Ágota Mészáros [1], Mónika Hujter [2], Zsófia Práger [2], Tibor Héja [1], Csaba Nemes [1], Zsolt Bagyura [1]
[1]Institute for Clinical Data Management, Semmelweis University
[2]Hiflylabs Zrt