# AI-Assisted Medication-Safety Decision Support for Crisis-Affected Healthcare Settings: From ADE Prediction to Practice

Shahd Abdo[1]* · Rashid Jayousi[2] | [1] Al-Quds Bard College, Al-Quds University, Palestine [2] Al-Quds University, Palestine | *Presenting author

A high-fidelity prototype translating ADE-prediction research into a transparent, clinician-facing workflow for crisis-affected settings.

## 1. Background & objective

### Medication safety under crisis conditions

In conflict-affected and resource-constrained healthcare settings, clinicians may need to review complex medication regimens rapidly, often with limited access to specialist support. AI models can identify patterns associated with adverse drug events (ADEs), but their value depends on whether predictions can be translated into a rapid, understandable, and responsible review workflow.

**OBJECTIVE** Translate an existing ADE-prediction model into an interactive medication-safety research prototype for structured review in crisis-affected healthcare settings.

## 2. Methodology

This project used a translational design approach. The underlying model was developed using FDA Adverse Event Reporting System (FAERS) data, with adverse reactions standardized using Medical Dictionary for Regulatory Activities (MedDRA) terminology.

Patient characteristics and medication attributes - drug name, dosage, route, and timing - were represented using BERT-based embeddings. An LSTM-based sequence-to-sequence architecture processed time-ordered medication sequences and generated multi-label ADE predictions.

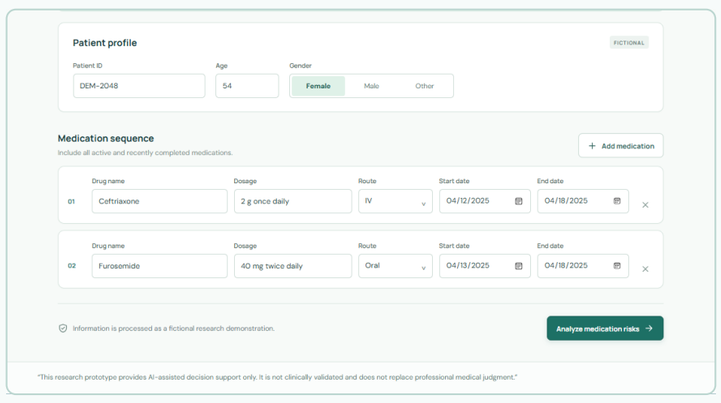
**These elements were translated into Vigilant, a high-fidelity interactive prototype.**

## 3. From prediction research to clinical workflow

**FAERS** report data → **MedDRA** standardized ADE terms → **Features** drug, dose, route, timing → **BERT + LSTM** sequence model → **ADE outputs** multi-label predictions → **Vigilant** prioritized review

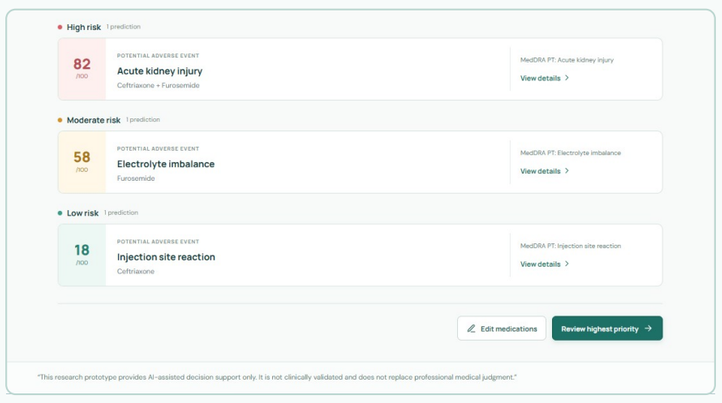
*Key principle: model outputs are presented for qualified professional review - not as automated clinical decisions.*

## 4. The Vigilant prototype: a four-stage medication-safety workflow



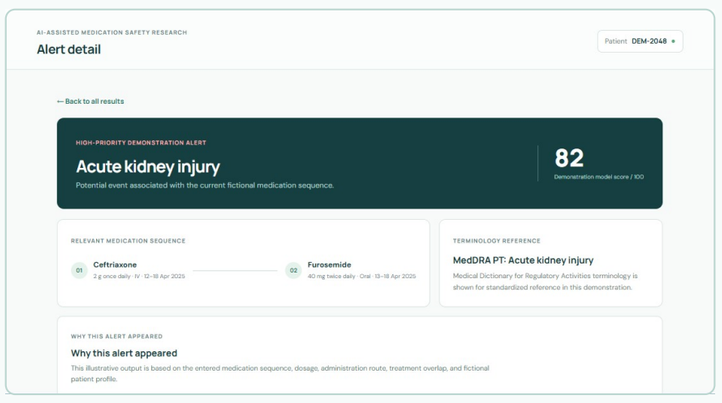

### 01 Patient & medication input

De-identified patient profile and medication sequence are entered for demonstration analysis.




### 02 Prioritized alert results

Illustrative potential ADEs are ranked by demonstration priority to support rapid review.




### 03 Selected-alert detail

The alert view links a potential event to the relevant medication sequence and MedDRA reference.

**Interface statement**

**The interface organizes potential concerns for professional review; it does not make clinical decisions.**

Research prototype only. Demonstration outputs are illustrative, not clinically validated, and do not replace professional medical judgment.

## 5. Prior model performance

| 93.22% | 91.89% | 92.55% |
|---|---|---|
| **Precision** | **Recall** | **F1-score** |

*Reported performance of the prior ADE-prediction model; these values were not independently reproduced by the Vigilant prototype.*

## 6. What is new in this project?

**The contribution is translational rather than purely algorithmic.**

Vigilant demonstrates how predictive research can be transformed into a clinician-facing medication-safety workflow that organizes medication information, prioritizes potential concerns, and supports qualified clinical or pharmaceutical review.

Designed for constrained environments: time pressure, fragmented information, limited specialist availability, and resource constraints.

**Avoided claims: clinical validation, diagnosis, causal conclusions, treatment recommendations, or replacement of professional judgment.**

## 7. Responsible AI features

**Transparent** Model outputs are separated from clinical conclusions.

**Human-reviewed** Potential concerns are directed to a qualified clinician or pharmacist.

**Explicitly limited** The prototype is not clinically validated and is intended to support - not replace - professional medical judgment.

**Recommended action in the prototype: consult a qualified clinician or pharmacist.**

## 8. Limitations & next steps

### Current limitations

Prototype outputs are illustrative; Vigilant is not currently connected to a deployed clinical model; no clinical validation or prospective deployment has been conducted.

### Next development phase

1. Clinical consultation and co-design with clinicians/pharmacists
2. Model integration and reproducibility checks
3. Usability testing and score calibration
4. External validation and prospective clinical evaluation

## Conclusion

From prediction to practice requires more than model performance. Vigilant demonstrates how ADE-prediction research can be translated into a transparent, human-supervised medication-safety workflow for settings where time, resources, and specialist access may be limited. Clinical validation and healthcare-professional evaluation remain essential before real-world use.

**Research prototype · Demonstration data only · Not clinically validated**

Contact: sabdo@staff.alquds.edu



*Note: All patient details, medication scenarios, adverse-event associations, and demonstration scores shown in the prototype screenshots are fictional illustrative outputs.*