AI-Supported Strategies to Optimize Polypharmacy and Medication Safety in Aging People With HIV

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Background

Aging people with HIV (PWH) are increasingly affected by multimorbidity and polypharmacy, which heighten the risk of adverse drug reactions (ADRs), drug–drug interactions (DDIs), and inappropriate prescriptions.

The aim of this study was to describe the implementation of an innovative, multidisciplinary, AI-supported quality improvement (QI) intervention at the Modena HIV Metabolic Clinic (MHMC), designed to optimize medication management in aging PWH. This study addressed:

1. Drug recognition and reconciliation, assessing the agreement between medications recorded in the electronic patient chart (EPC) and those reported by the patient;
2. Quantification of total number of active pharmacologic agents and pill burden, as well as identification of actionable alerts generated per patient, including drug-drug interactions, potential inappropriate prescriptions (PIM), anticholinergic burden, and exposure to drugs associated with QTc prolongation and nephrotoxicity;

Methods

- This was a cross-sectional study including PWH ≥ 50 years attending MHMC with multimorbidity and polypharmacy.
- Details regarding QI are shown in Figure 1.
- The primary outcome was the level of agreement between the medications listed in the EPC and those reported by the patient.
- Discrepancies were categorized as medications reported by the patient but absent from the EPC or medications listed in the EPC but no longer taken by the patient.
- Complete agreement was defined as 100% concordance, while values below 100% were considered suboptimal.

PLAIN LANGUAGE SUMMARY

Older people living with HIV often experience polypharmacy, increasing the risk of harmful drug interactions and side effects. This study shows that using AI tools and pharmacist review can improve medication accuracy and safety while supporting better, more personalized care.

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AI-supported medication reconciliation with pharmacist review improves detection of undocumented drugs and prescribing risks in older PWH, enabling safer and more effective polypharmacy management.

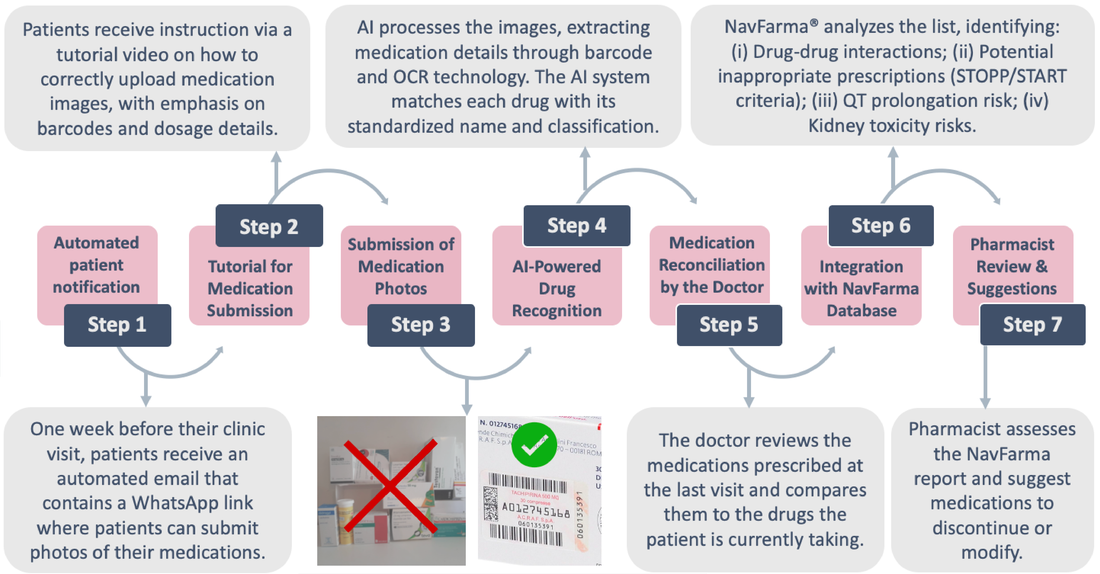


Figure 1. *Workflow of the QI project.*

Results

- 181 PWH submitted photo, 98 (54.1%) were reviewed by the pharmacist.
- Median age was 63 years, 131 (72%) were male, current CD4 count was 747 cells/µL, and median time since HIV diagnosis was 31 years.
- Figure 2 presents level of agreement between the medications listed in the EPC and those reported by the patient among PWH. No significant differences were observed across demographic or HIV-related characteristics according to agreement status (all p >0.05).
- Major DDIs are listed in Figure 4 and were defined as those with potential for serious clinical consequences requiring therapy modification.
- Drugs listed in Figure 5 represent those most frequently contributing to cumulative pharmacologic risks identified through the AI-supported NavFarma® system and pharmacist review.

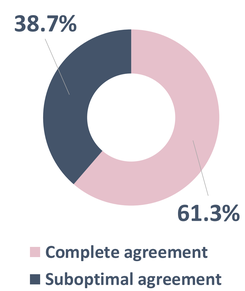


Figure 2. *Level of agreement.*

Pill burden (median)	Active agents (median)	Major DDIs (prevalence)	Minor DDIs (prevalence)
6 (IQR: 4.8)	10 (IQR: 5)	78/98 (71.4%)	59/98 (60.2%)

Figure 3. *Medication burden and drug-drug interactions*

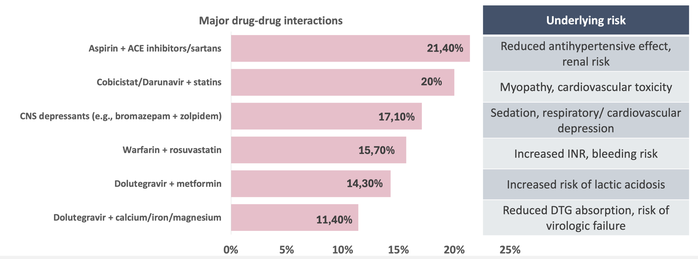


Figure 4. *The most common major DDIs identified through pharmacist and AI-supported review.*

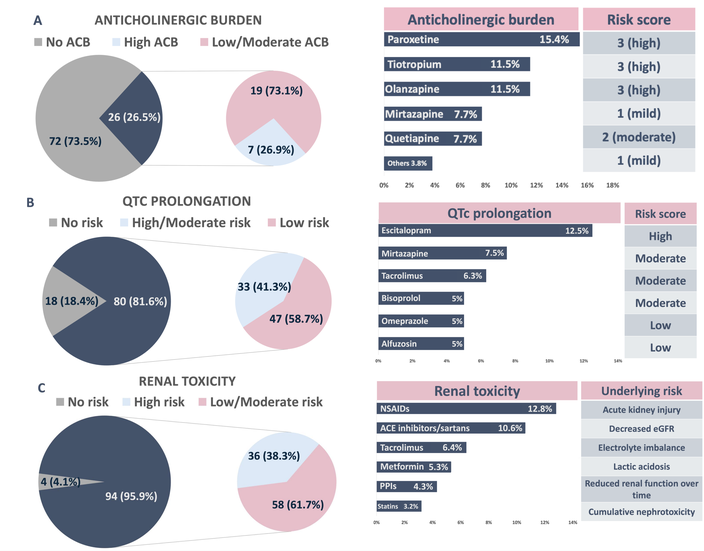


Figure 5. *Anticholinergic burden (panel A), QTc prolongation risk (panel B) and renal toxicity (panel C).*

Conclusions

- AI technology together with clinical judgment improves polypharmacy management in aging PWH.
- Medication reconciliation and identification of DDIs and PIMs were facilitated and more accurate.
- The project supported the integration of pharmacist-led reviews into routine HIV care to enhance medication safety.

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