

Predicting HIV Therapy Non-Compliance

Government of South Africa | Early warning and adherence intervention protocols

Who it was for: Government of South Africa and healthcare providers

Nucleus's role: Recurring data ingestion, patient registry development, predictive scoring, and recommendation protocols

Overview

Nucleus developed a data-driven approach to help healthcare providers identify patients who might deviate from prescribed HIV therapy pathways and focus adherence support earlier. The engagement connected recurring patient data feeds with a longitudinal registry, a risk prediction layer, and recommendation protocols for provider action.

The work established a repeatable process for moving incoming information through risk assessment and returning outputs to the client environment. Results were packaged as CSV files for electronic medical record (EMR) upload, providing a practical connection between analytical processing and clinical workflows.

The Challenge

The project addressed deviations from prescribed treatment protocols among some patients receiving effective first-line HIV therapies. The client's concern was that non-adherence could contribute to drug resistance and escalation to higher-cost regimens, increasing the importance of timely adherence support.

Clinicians lacked a targeted early warning system to help focus interventions. They needed a way to identify patients who might benefit from additional attention before deviations became more difficult to address. This required bringing recurring patient information into a consistent structure and interpreting it across time.

The operational challenge was to create a process that could work repeatedly across incoming data feeds and return information in a format usable by the client. Risk assessment needed to connect with recommendation protocols and an established delivery path so that providers could use the outputs in follow-up activities.

What Nucleus Delivered

Nucleus implemented recurring feed-based ingestion and a longitudinal patient registry. The registry organized incoming information into patient tables, providing a foundation for examining patient data over time rather than treating each delivery as an isolated set of records.

A predictive risk layer scored the likelihood of non-adherence and flagged potential deviations from therapeutic pathways. The purpose was to support targeted provider attention by surfacing patients who might require adherence follow-up.

Nucleus paired the risk prediction layer with a protocol engine that generated recommended actions. This connected the analytical output with guidance for provider response, helping turn a score into information relevant to follow-up planning.

The results were packaged as CSV outputs for upload into the client's EMR environment. This delivery format supported client-side ingestion and clinical use without requiring the project to replace the existing record system.

How the Workflow Operated

Controlled intake. Daily or weekly data drops entered a controlled intake process. Recurring ingestion created a regular basis for updating the information available to the analytical workflow.

Normalization and registry updates. Incoming records were normalized into patient tables and incorporated into a longitudinal registry. This preparation supported consistent downstream processing and a patient-level view across successive feeds.

Risk prediction. The risk model assessed the likelihood of non-adherence to therapeutic pathways. Scores were used to surface potential deviations for provider attention; they represented predicted risk rather than confirmation that a patient had deviated from treatment.

Recommendation generation. A protocol engine translated the risk assessment into recommended actions. These outputs provided guidance for provider follow-up and connected prediction with the intended adherence intervention workflow.

Return to the client. Scores and recommendations were packaged for client-side ingestion, including CSV output for EMR upload. The recurring feed cadence supported a repeatable operational process rather than real-time monitoring.

Reported Impact

The project account describes proactive adherence support, reduced avoidable escalation to second-line treatment, and a scalable operational process. The combined ingestion, scoring, and recommendation workflow supported the aim of directing provider attention toward patients who might benefit from earlier intervention.

The impact is presented qualitatively. The account identifies a practical path from recurring data to targeted follow-up, with outputs returned to the client environment for use in established clinical processes.

Capabilities Demonstrated

The engagement demonstrates Nucleus's ability to connect population-scale ingestion, longitudinal patient data, predictive risk scoring, and recommendation protocols. It also illustrates an integration approach in which analytical results are returned through a straightforward file-based interface for use by the client.

For healthcare providers, the value of the approach was a repeatable way to surface potential adherence concerns and receive corresponding recommendations. The workflow connected ongoing data updates with targeted follow-up support while retaining the client's EMR as the destination for clinical use.