AllyTalk

AI-Driven Clinical Analytics: Turning Complex Oncology Data into Actionable Insights

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Disclosure

Scott Newman works for **Meaningful Insights | BioTech Analytics** (MiBA), a company that provides data services to community oncology and biopharma partners

The patient is at the center of everything that we do but …

But what is their:

Diagnosis *Stage* *Grade* *Histology* *Labs*

> ***The patient is at the center of everything that we do but …***

Diagnosis date

Comorbidities *LoT* *Procedures* *Insurance*

Metastatic status *NGS Results* *Adverse events* *Medications …*

20% of patients being treated for cancer within the MiBA network don’t have staging information readily available

Problem 1:

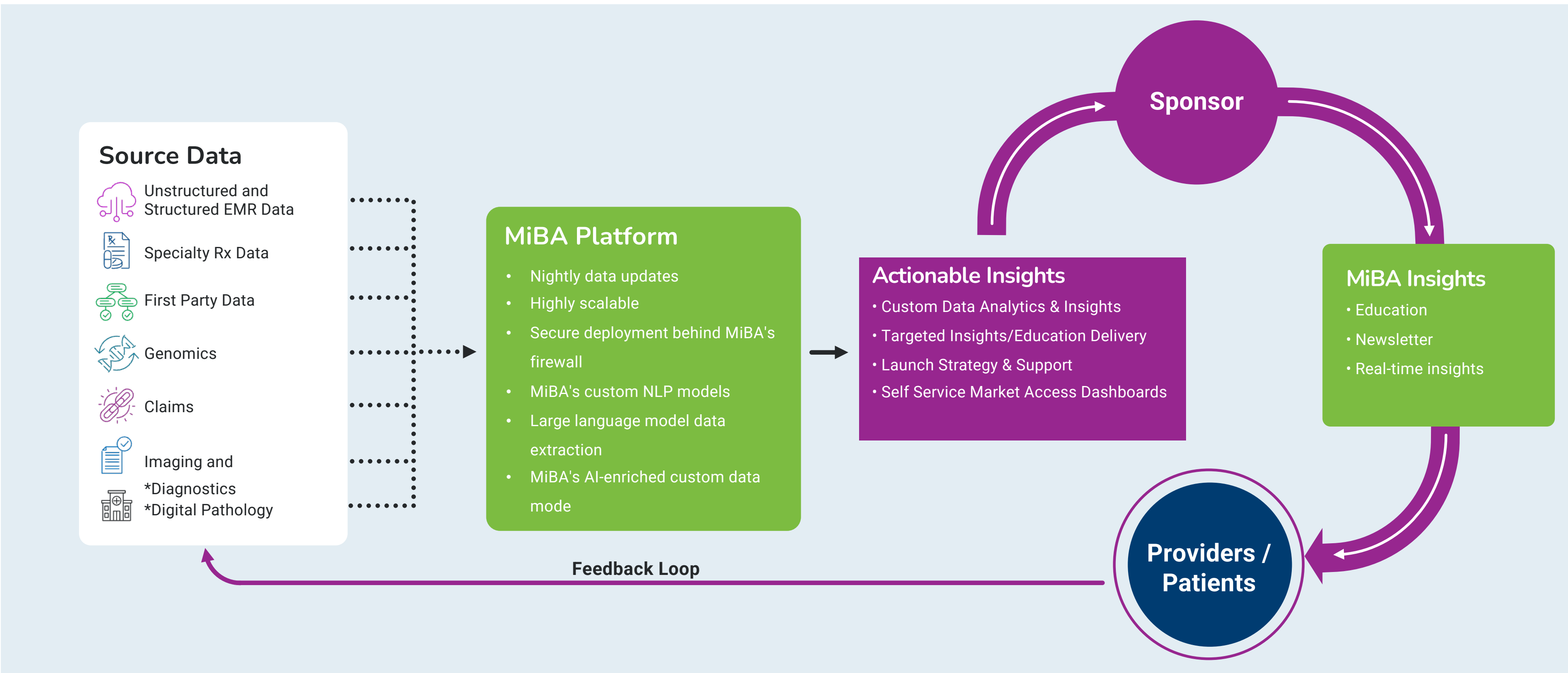
There is a high degree of ‘missingness’ for nearly every important piece of information

Problem 2:
It is challenging to see the entire patient journey as the data is spread across systems

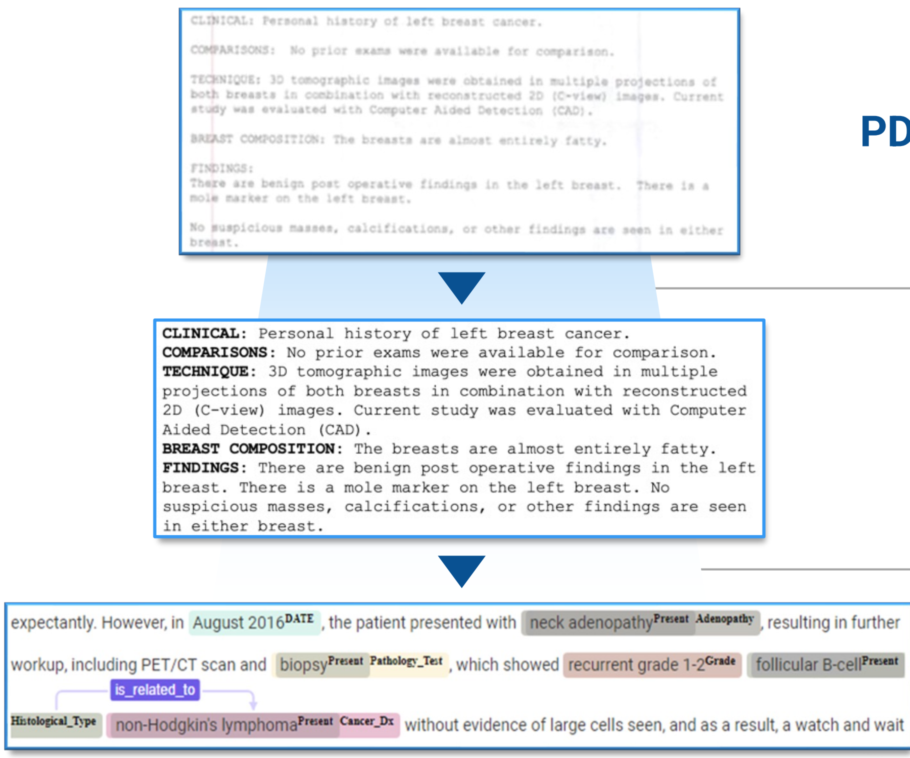
We need a complete and accurate patient journey to do almost anything in the oncology analytics space

The Solution:
An AI-augmented and holistic oncology data model

Data Production Line



Natural Language Processing Mines Clinic Notes and PDFs



PDFs, scans and raw note text

Computer-readable text

NLP model extracts 'entities' and 'relationships'

Large Language Models Go a Level Deeper

False Positive by NLP:

- Discussed the implications of a **positive ROS1 result**. She continues on immunotherapy until NGS testing comes back …

ROS1 negative by LLM

False Negative by NLP:

- [NGS] testing showed a **TKI fusion**. Anti-ROS1 therapy, started

ROS1 positive by LLM

All Data Feeds in a Single Unified Model

MiBA Data Dictionary, Version 2.0

Table Name	Table Description
patient	Information about patients in the dataset
cancer_dx	Information about patient's cancer diagnoses. Each row represents one primary cancer diagnosis for the patient
cancer_dx_biomarkers	Extension table for cancer_dx. Table containing biomarker results linked to each cancer diagnosis, joinable to the cancer_dx table on patient_id and cancer_group_name
cancer_dx_diagnostic_factors	Extension table for cancer_dx. Table containing cancer-specific diagnostic factor results linked to each cancer diagnosis, joinable to the cancer_dx table on patient_id and cancer_group_name
comorbidities	Additional diagnoses for other diseases assigned to patients
icd10_codes	Table of all ICD10 codes assigned to the patient, and in which context and with earliest and latest assignment dates
ecog_status	Patient's ECOG Status history, with the most recent ECOG Status flagged
pain_scores	Patient history of Pain Score reporting. Includes date, scale used, and provided pain score
genetic_results	Patient genetic results obtained from NGS testing. Includes short variants, copy number variants, and fusions. Also linked to cancer_dx via patient_id and cancer_group_name, where available
lab_results	Patient lab results, mapped to LOINC code. Containing cleaned, mapped values as well as underlying (source) data
vital_signs	Vital sign history for the patient. Includes weight, height, temperature, O2 Saturation, pulse, and others
medications	Patient medication history, including date of drug record and mappings to cleaned generic and branded drug names
lines_of_therapy	Description of drug lines patients have taken, mapped to individual cancer diagnoses
procedures	Procedures (including surgery, imaging, and genetic testing) this patient has undergone, dated and linked to a cancer type if available
family_history	List of cancer conditions in the patient's family history, with specific listing of the relevant family member, if known

15 core tables, > 300 data elements and growing

Updated nightly

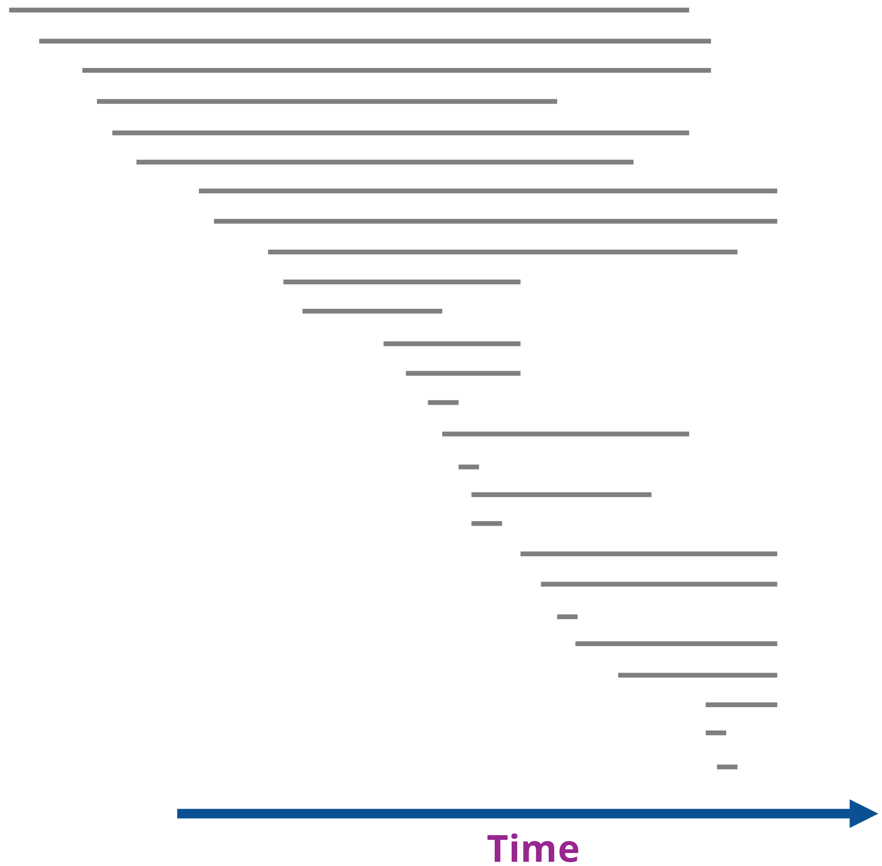
Data Element	Increase %
Histology	**67.5**
Stage	**19.5**
Metastasis	**39.9**
ER	**34.9**
PR	**34.2**
HER2	**34.6**
EGFR	**47.1**
ALK	**106.9**
BRAF	**81.5**
RET	**29.6**
ROS1	**17.6**

% increase in record count after incorporating NLP data

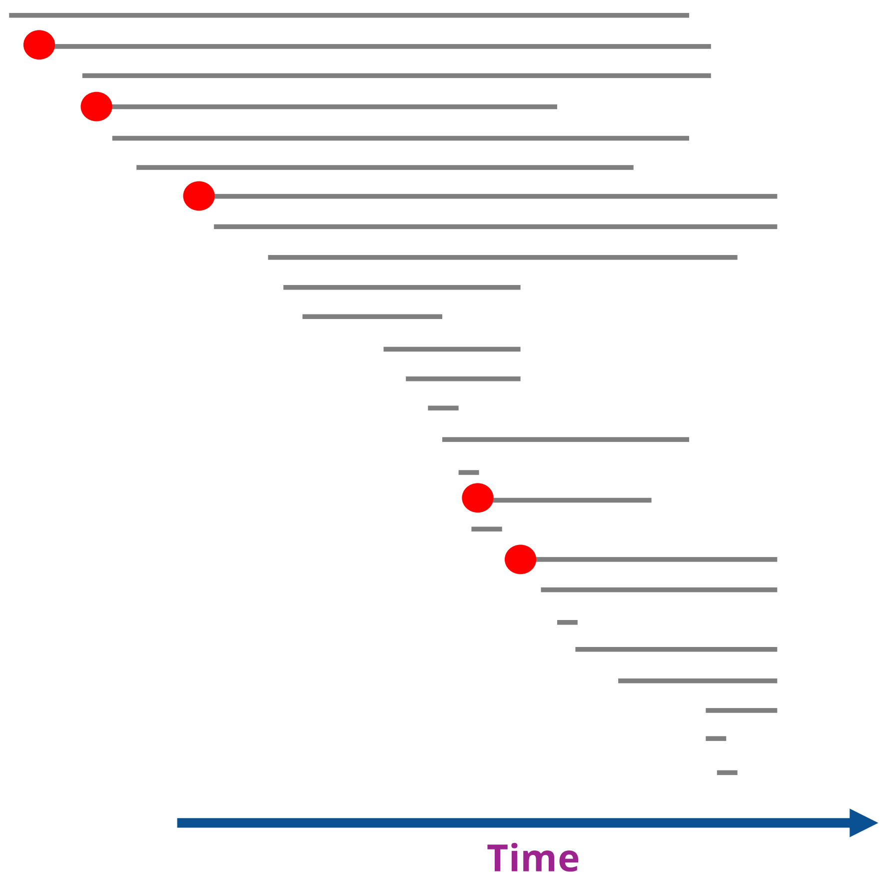
The Power of an AI-Augmented Data Model in the Real World

Who could benefit from a newly-approved ROS1-targeted therapy?

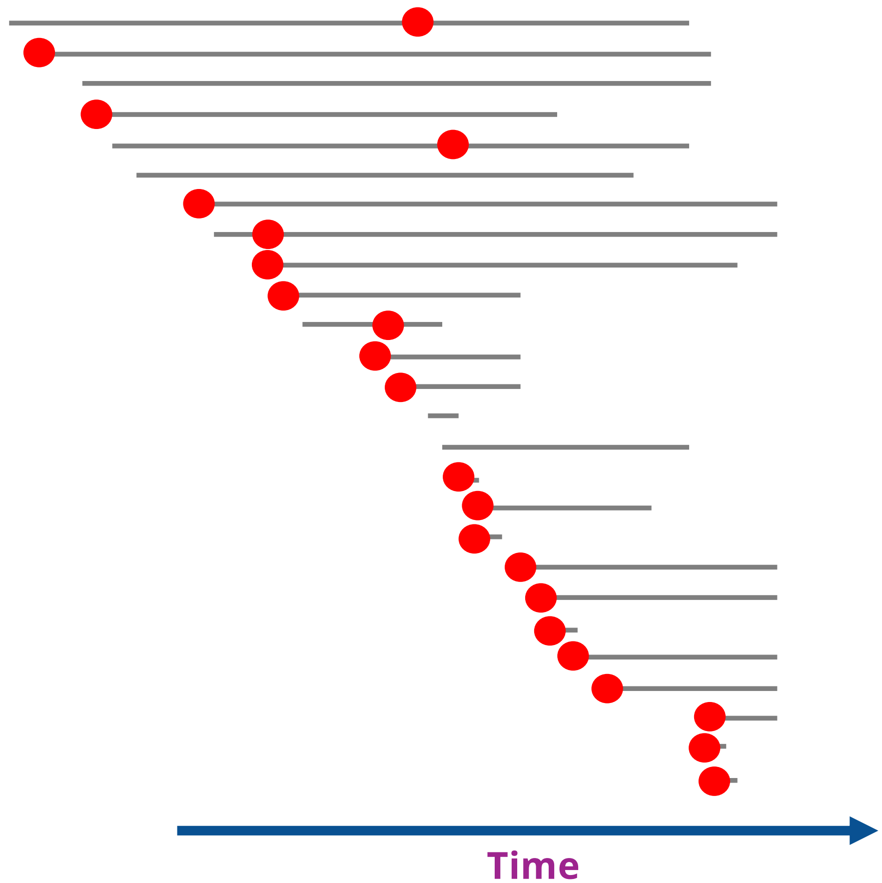
Patients with a ROS1 fusion by NGS



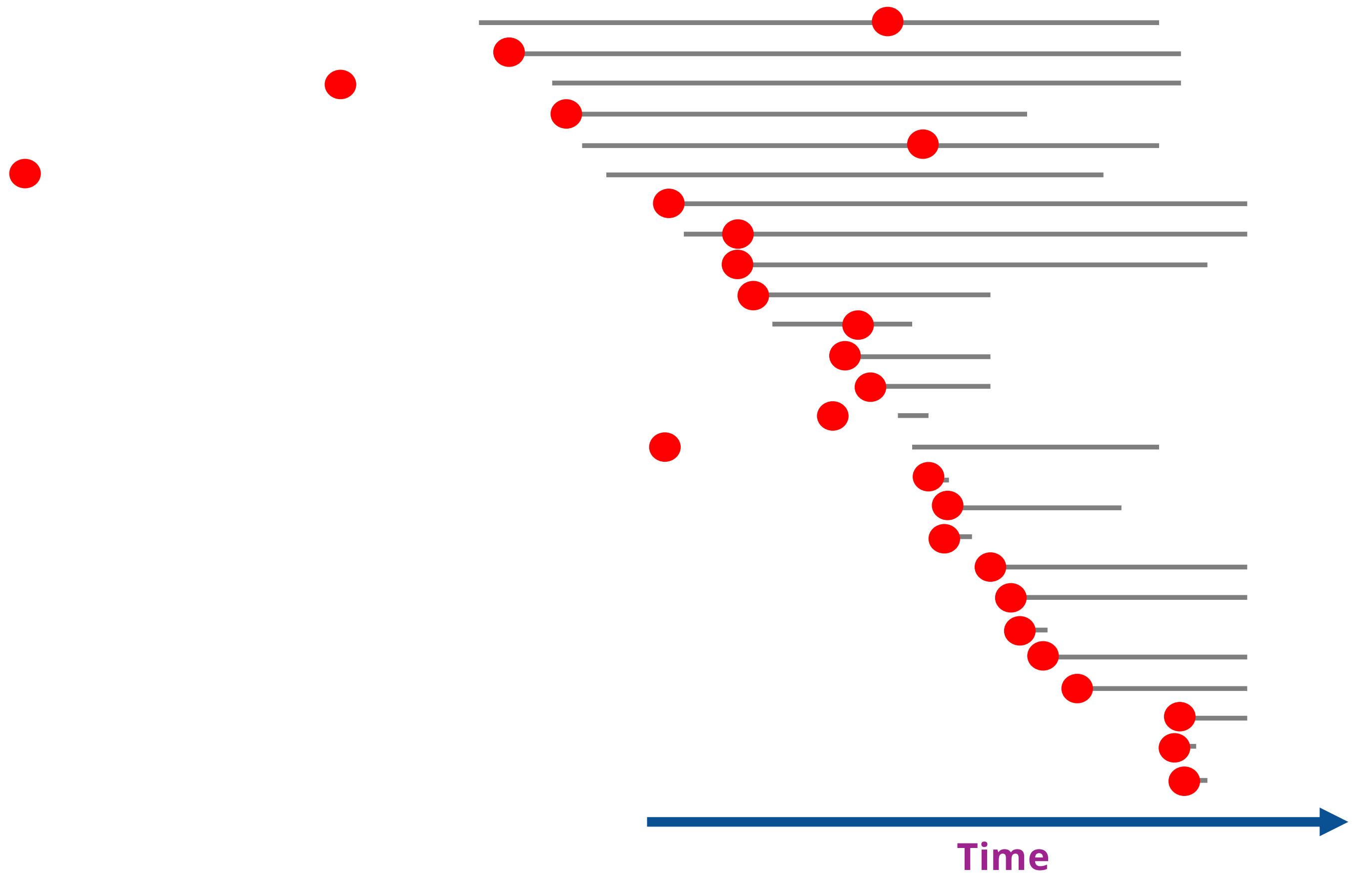
Captured by the EMR (n=5)



Captured by live data feed from NGS providers (n=22)

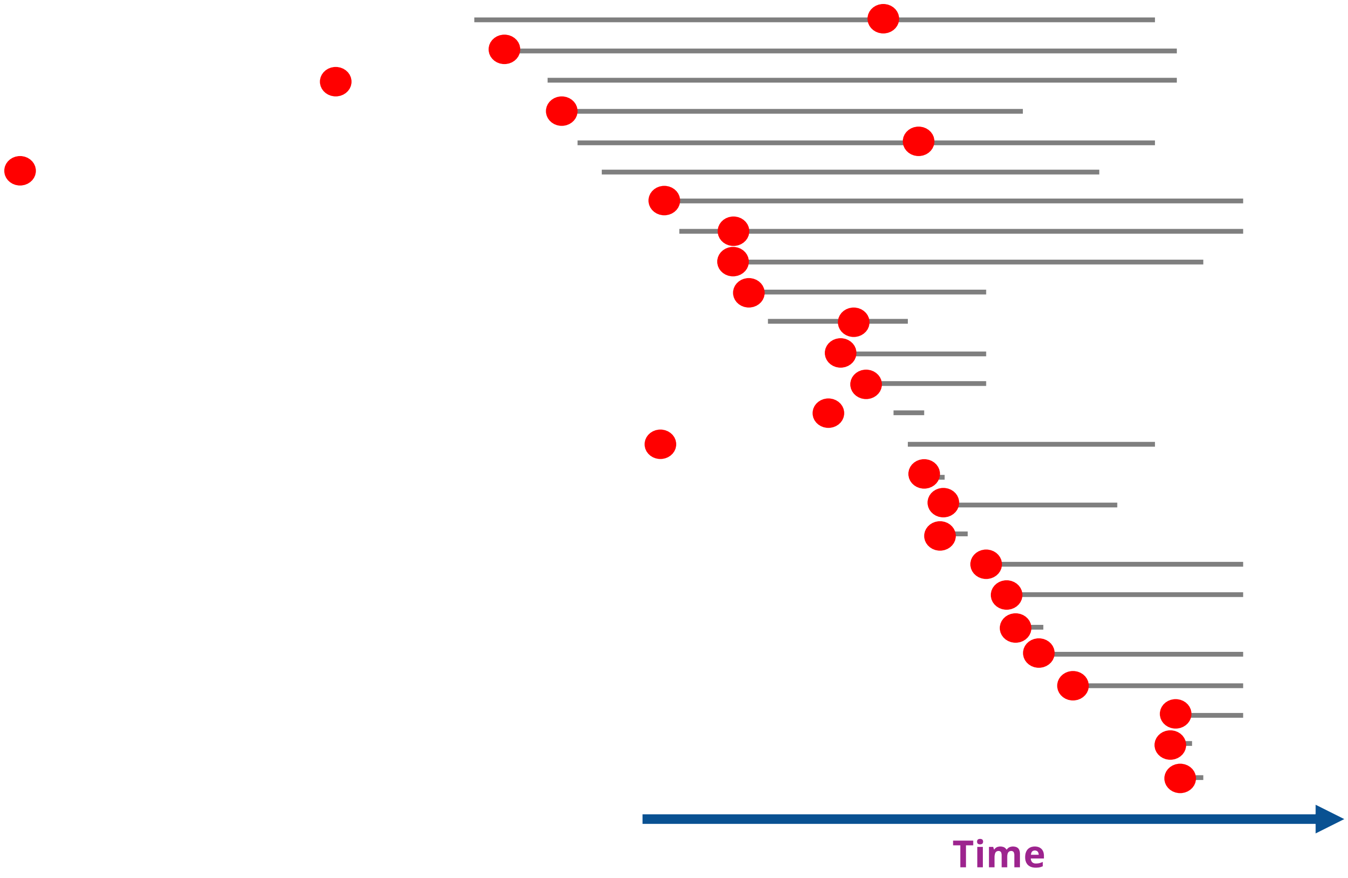


Recovered by NLP/LLM on clinic notes and scanned documents (n=26)



Key Finding 1:
You'll underestimate the true patient population unless you take a multimodal approach

Recovered by NLP/LLM on clinic notes (n=26)



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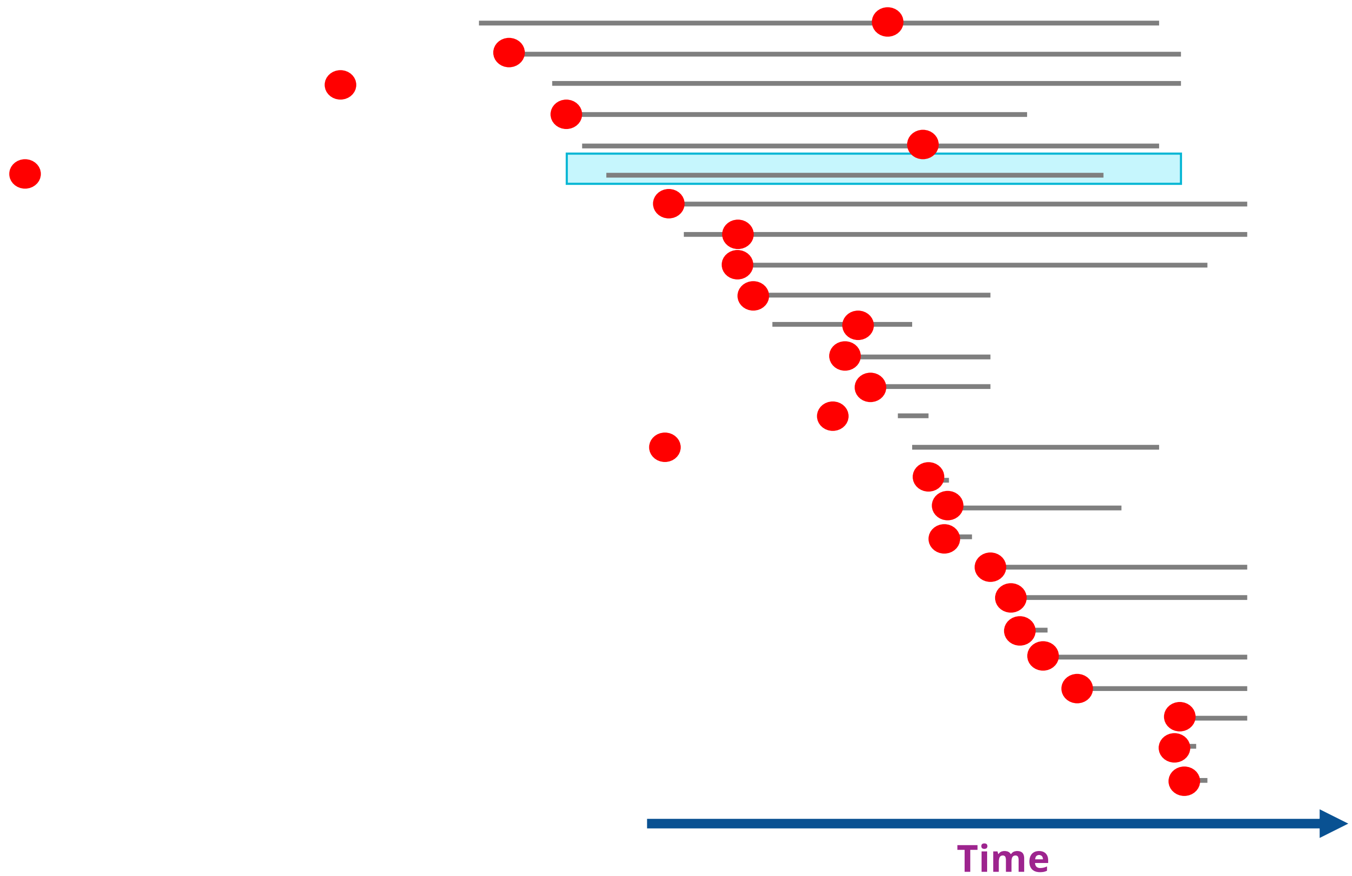
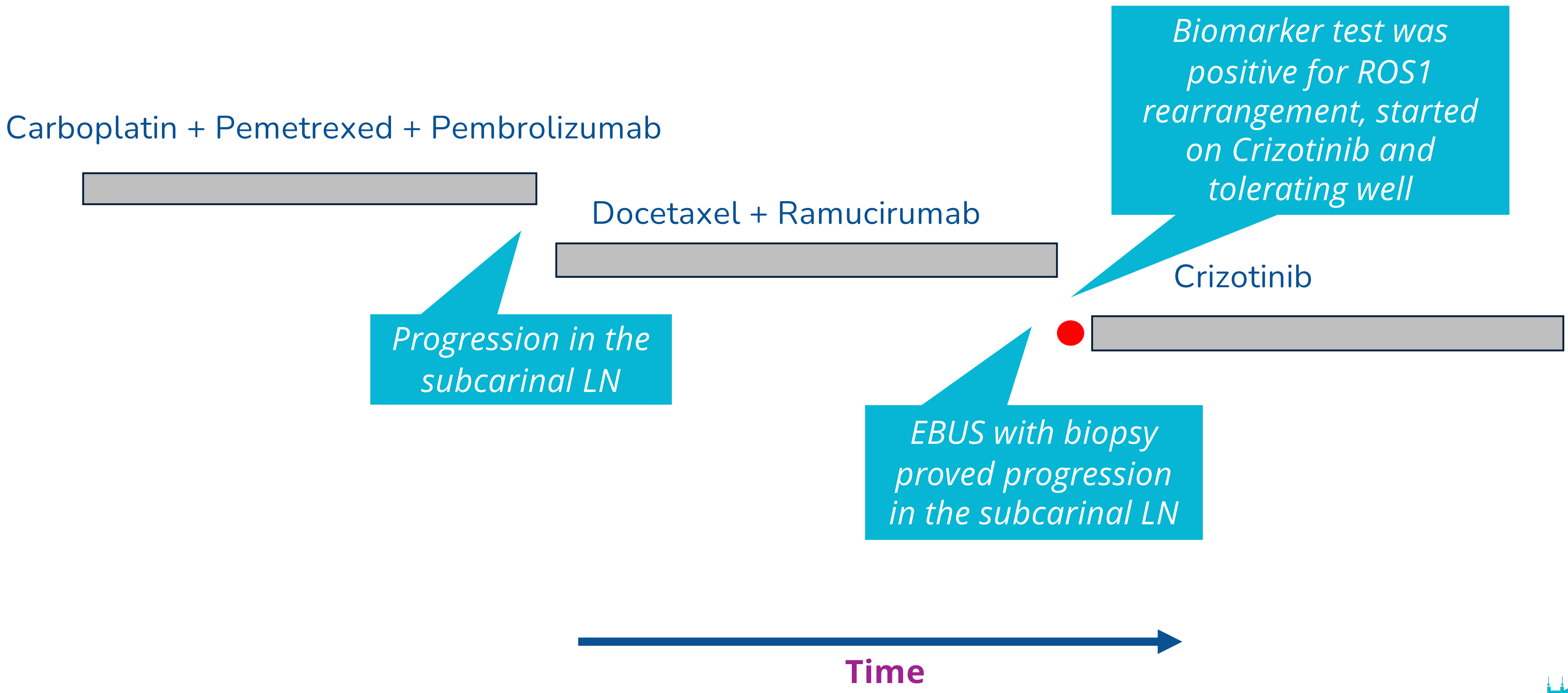
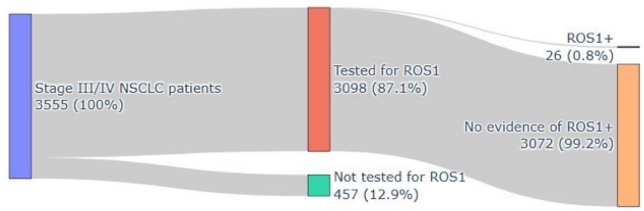


‘Patient Journey’ constructed from an AI reading of clinic notes

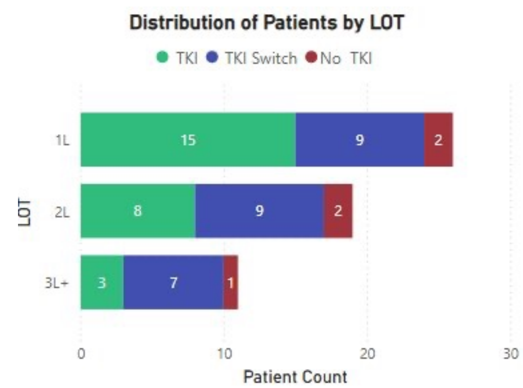




Was NGS testing optimal?

Key Finding 2:
Comprehensive patient journeys allow us to dig deeper

Were treatments and treatment sequences optimal?



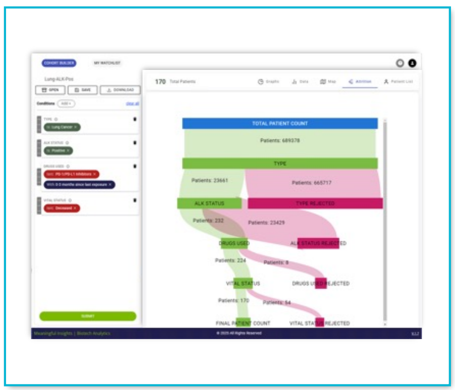
Would you have managed this patient differently?

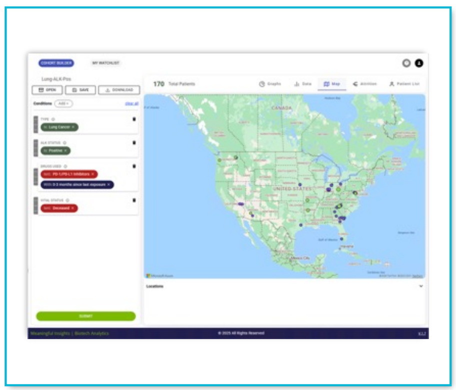
What if an AI system suggested different management?

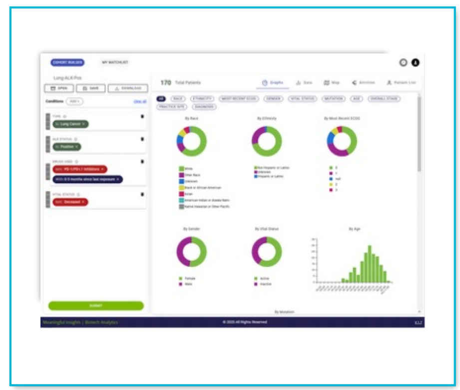
What is possible now

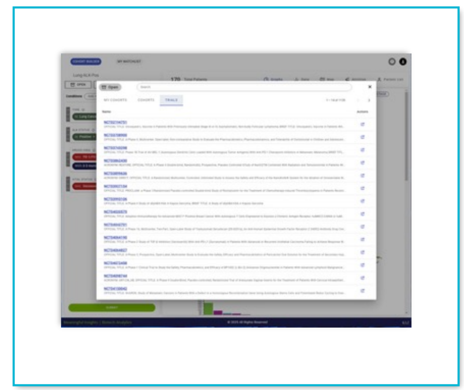
- Can fill in the blanks and correct errors in complex patient histories
- Gain a better understanding of our patients at massive scale

Volume-based contracting → ‘Clinically rational’ contracting
Abstraction-heavy QI projects → Real-time dashboards
Manual matching to trials → Automated and efficient matching









What will be possible soon

- Placing your patient on a pathway such as NCCN
- Data-driven recommendations for the next stage of their care

What will not be possible soon

- AI making clinical decisions: It's an assistive technology

What can you do now?

- Assess your data infrastructure
- Understand your knowledge gaps and how accurate data might be applied
- Find a data partner who gives something back to you

QUESTIONS

AND

COMMENTS

Thank You

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