AI-Assisted Approaches for Defining Lines of Therapy in Oncology Real-World Data: An Exploratory Analysis in Chronic Lymphocytic Leukemia

MSR218

Eric Chen, Catherine Fu, Keri Yang

BeOne Medicines, Inc., San Carlos, CA, USA

CONCLUSIONS

- LOT outputs remain sensitive to operational definitions and require expert adjudication, regardless of derivation approach
- AI-assisted LOT derivation offers a scalable and transparent alternative to manual rule-based methods, substantially reducing time burden and enabling systematic testing of methodological assumptions
- Accurate AI performance depends on clear specification of prompts and foundational regimen information. Differences in detecting treatment-switch events were a notable contributor to line-count discrepancies
- Findings reinforce the need for standardized LOT frameworks to enhance reproducibility and comparability of oncology real-world data analyses

BACKGROUND

- Accurate derivation of lines of therapy (LOT) is foundational for real-world oncology research, informing treatment pattern analyses, comparative effectiveness evaluations, and burden-of-illness studies
- LOT determination remains inconsistent and highly variable in practice, with no universally accepted standard algorithm
- AI-assisted approaches offer a potentially scalable and transparent alternative to labor-intensive manual rule-based methods

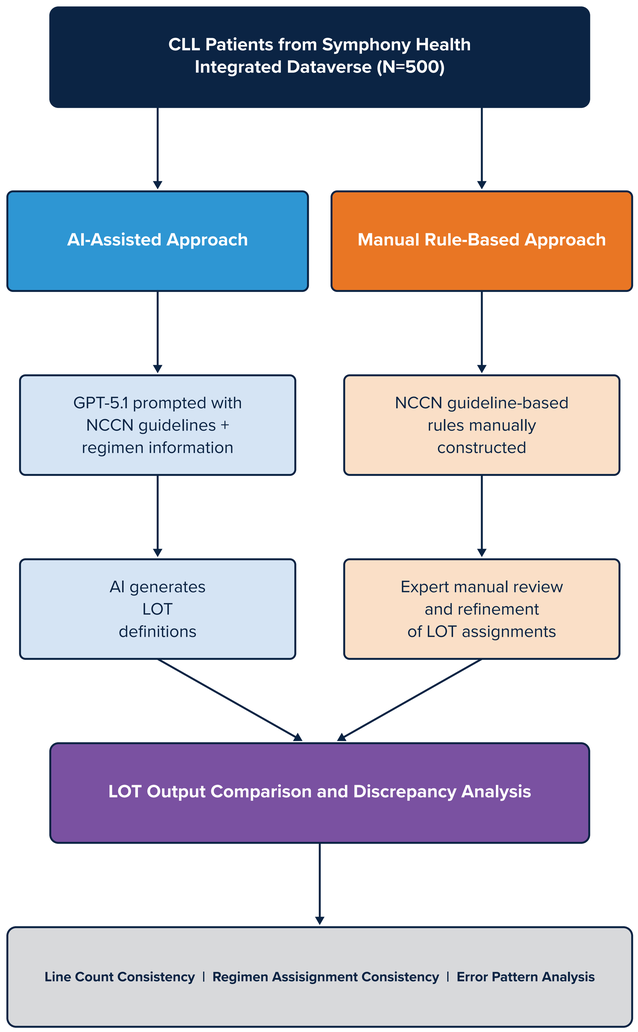
OBJECTIVES

- Examine AI-assisted and traditional manual LOT derivation approaches to understand how methodological choices impact LOT results
- Assess consistency in LOT assignments and treatment regimen classification between two independent approaches
- Identify and characterize sources of discrepancy between AI-assisted and manually curated LOT outputs

METHODS

- An exploratory comparison of two LOT approaches was applied to 500 randomly selected CLL patients from Symphony Health Integrated Dataverse®, a nationally representative US open-claims database
  - AI-Assisted Approach: GPT-5.1 prompted with NCCN guidelines and treatment regimen information to generate LOT definitions
  - Manual Rule-Based Approach: NCCN guideline-based rules manually constructed and further refined through expert review
- LOT outputs from both approaches were compared at the patient level for line-count consistency and regimen-level agreement

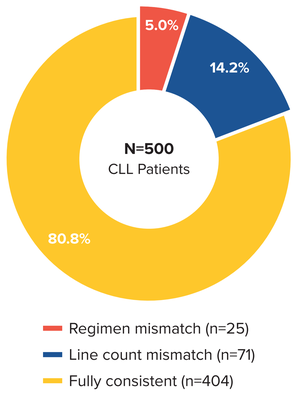
Figure 1. Study design and analytical framework



RESULTS

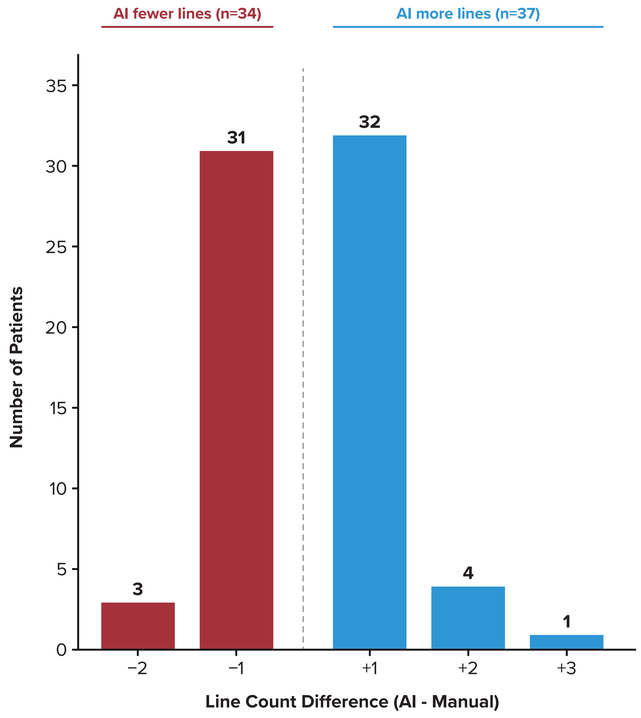
Overall Consistency

Figure 2. Patient-level LOT consistency classification (N=500)



Line Count Mismatches

Figure 3. Distribution of line count differences between AI and manual approaches (n=71 patients with mismatches)



Discrepancy Sources

Figure 4. Breakdown of discrepancy sources across mismatch categories

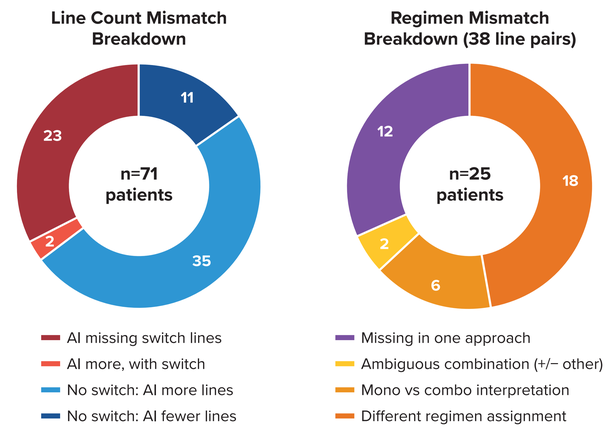


Table 1. Most common regimen mismatch patterns (generic names shown; 25 patients, 38 mismatched line pairs)

Manual (Ground Truth)	AI Assignment	n
Chlorambucil +/− other	Obinutuzumab + chemo	4
Zanubrutinib monotherapy	[Missing]	4
Venetoclax monotherapy	Venetoclax +/− other	2
[Missing]	Rituximab monotherapy	2
[Missing]	Ibrutinib monotherapy	2
[Missing]	Zanubrutinib monotherapy	2

REFERENCES

1. National Comprehensive Cancer Network. NCCN Clinical Practice Guidelines in Oncology: Chronic Lymphocytic Leukemia/Small Lymphocytic Lymphoma. Version 1.2026.
2. Symphony Health Integrated Dataverse. Accessed 2025.

DISCLOSURES

EC, CF, and KY are employees of BeOne Medicines and may hold stock or stock options.

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CORRESPONDENCE: Catherine Fu, catherine.fu@beonemed.com

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