Semi-automated discovery of real-world patient pathway from U.S. electronic health records: Advanced non-small cell lung cancer (aNSCLC).

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Abstract Disclosures

Background:
A good understanding of cancer care continuum presents opportunities to uncover unmet medical needs and improve outcomes and clinical workflow efficiency. However, patient care is poorly understood in real-world clinical practice. This study aimed to discover real-world patient pathways for advanced non-small cell lung cancer (aNSCLC).

Methods:
This study included patients diagnosed with aNSCLC (stage IIIB and above) at their initial diagnoses between 2011-2018 from the Flatiron Health electronic health records (EHR)-derived deidentified database. Overall survival (OS) was calculated using the Kaplan-Meier method. We also explored the application of process mining analytics (Heuristics Miner & Directly-Follows Graphs) to describe and visualize real-world patient pathways, following patients from initial diagnosis, through any National Comprehensive Cancer Network guideline-recommended companion diagnostics (CDx; including EGFR, ALK, ROS1, KRAS, BRAF, or PD-L1) and treatment patterns, until death or end of the study.

Results:
A total of 39,156 eligible patients were included. During a median follow-up of 0.78 years (interquartile range [IQR] 1.27), 28,801 (73.6%) patients died (median OS 11.6 months [95% CI 11.4 -11.8]). We established a semi-automated process discovery pipeline that transforms high-dimensional EHR datasets in table format as input into real-world event logs and produces a series of patient pathway graphs as output. The patient pathway graphs showed 19,878 (50.8%) patients had CDx testing within a median 11 days (IQR 18) and 29,241 (74.7%) patients started first-line therapy within a median 1.2 months (IQR 1.2) after the initial diagnosis. When we stratified analysis by years of initial diagnosis (2011-2014 vs 2015-2018), 38.8% (6808 of 17546) vs. 60.5% (13070 of 21610) patients had their first CDx testing within median 12 days (IQR 21) vs. 10 days (IQR 17) respectively.

Conclusions:
This study suggested an uptake of 56% increase of CDx utilization over the last 8 years in real-world clinical setting and that patient pathways can be analyzed and visualized in a semi-automated fashion.