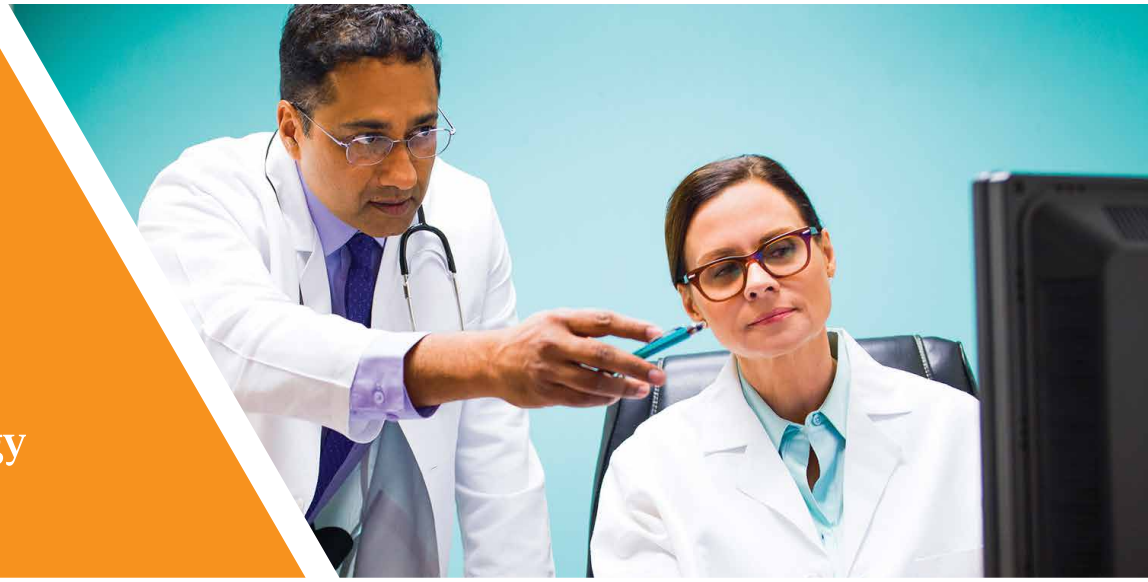
The US Oncology Network



Case Study

Impact of automatic, EMR-based result delivery of liquid biopsy results on patient care

Background

The promise of "liquid biopsy" that analyzes plasma-based circulating tumor DNA (ctDNA) has been well studied in oncology settings, with potential clinical benefits including a less invasive approach, quickened turnaround time, and capture of disease heterogeneity compared to tissue-based approaches.[1] Additionally, plasma-based ctDNA analysis has high concordance to tissue-based methods, as proven across various solid tumor types including non-small cell lung cancer (NSCLC), breast, GI cancers, and others.[2-4]

Although liquid biopsy is well studied scientifically and clinically, many tests frequently used in clinical settings in the United States are ordered outside of the electronic medical record (EMR), creating novel workflow challenges for ordering and resulting of such tests. While ctDNA assays have a faster turnaround time, which helps reveal the genomic profile of a cancer, this quickened time may not be actualized in patient care due to delays in ordering, case resolution, and/or results access, given the placement of liquid biopsy processes outside of the EMR.

The aim of this quality improvement study was to assess the impact of an improved EMR-based workflow for results delivery of liquid biopsy testing ordered as part of routine clinical care.

Methods

The US Oncology Network, a network of community-based oncology providers, launched automatic results delivery into their EMR platform, iKnowMed, in November 2022, which enabled results to be delivered directly to the EMR for Guardant360 tests. Prior to the launch of the EMR resulting solution, results would be delivered to clinicians through a portal outside of the EMR and/or by fax, at which time staff members in a centralized office would scan the result into iKnowMed (Figure 1). Guardant360 is validated ctDNA assay with a turnaround time of 7-10 days which can be used to assess presence of biomarkers that may guide therapy selection and/or clinical trial enrollment.[5]

For the purposes of this quality improvement study, two unselected cohorts were developed from patients tested at the Comprehensive Cancer Centers of Nevada (CCCN), a member of The US Oncology Network: a "PRE" cohort that experienced resulting through the scanned mechanism and a "POST" cohort that experienced resulting through automated EMR delivery. Forty patients were targeted for inclusion in each cohort. As such, the PRE cohort began two months prior to EMR integration deployment and included each patient tested until 40 were reached; the POST cohort began two months after EMR implementation and subsequently included each patient tested until 40 were reached. Datasets were de-identified.

For each patient the following dates were assessed: date of blood collection for test (Guardant360), date of test result, date delivered to electronic medical record, and date of immediate next visit following test blood collection. Where any dates were missing, the patient was excluded. To assess difference between cohorts, t-tests were used with significance defined as $p<0.05$.

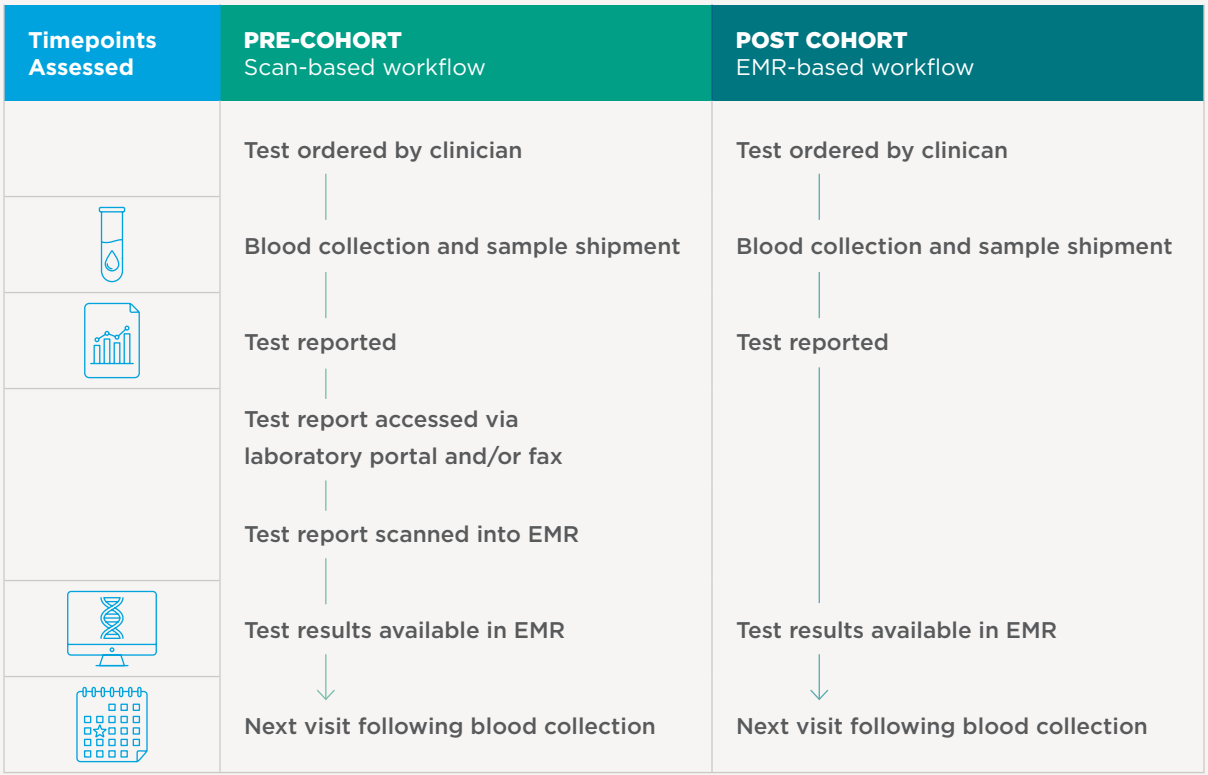


Figure 1. Workflow comparison and timepoints assessed

Results

A total of 36 patients were included in the PRE cohort and 38 patients in the POST cohort. In the PRE cohort, 64% of patients had colorectal or other GI cancers, 14% had breast cancer, 11% lung cancer, 11% other cancer; similar trends were observed in the POST cohort (68% colorectal or other GI cancer, 13% breast cancer, 11% lung cancer, 8% other cancer). The median age was 61.5 years (range: 31-81) for the PRE cohort and 61 years (range: 23-84) for the POST cohort.

For the PRE cohort, the mean turnaround time from blood collection to test report was 10 days (median: 9.5, minimum: 6, maximum: 15). For the POST cohort, the mean turnaround time from blood collection to test report was 9 days (median: 8, minimum: 6, maximum: 14). There was not a significant difference between turnaround times across cohorts (p=0.102).

Using a workflow that scanned electronic results into the medical record, patients in the PRE cohort experienced a mean of 7.36 additional days from the test result to the date the record was scanned into the EMR (median: 2, range: 1-64). Six patients (13.8%) had no results available for their next subsequent appointment, of which 4 (67%) had a test result from the laboratory available that had not been scanned into the EMR.

Following the implementation of EMR-based results delivery, no additional days were added in from date of test result to the result being available in the EMR. Thirteen patients had no results available for the next subsequent appointment, however, only 2 (15%) had results from the laboratory available that had not been imported into the EMR due to the appointment being on the same day results were released; the remaining 9 were under the laboratory's turnaround time (e.g., less than 7 days since blood collected).

When assessing the entirety of the patient journey, the mean time from blood collection date to when the results were accessible in the EMR was an average of 17.4 days for the PRE cohort (median: 14, range: 8-70) and was an average of 9 days for the POST cohort (median: 8, range: 6-14), which was found to be a statistically significant difference (p=0.0005) (Figure 2).

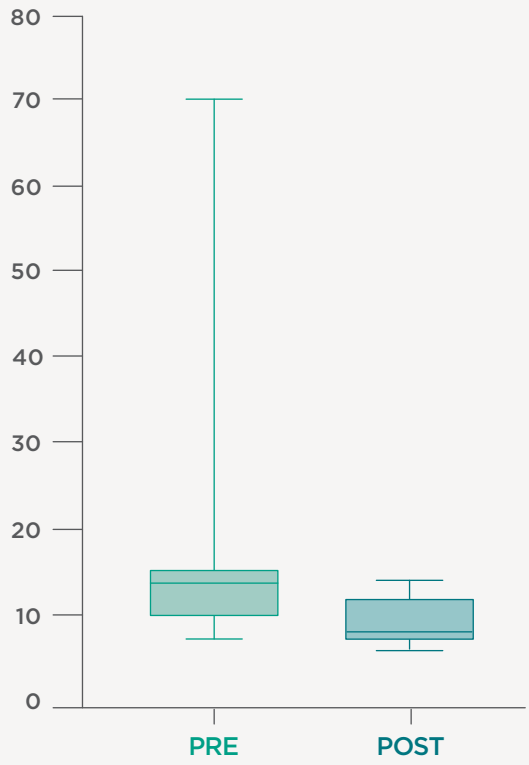


Figure 2. Comparison of result availability across cohorts

Discussion

This quality improvement study showed implementation of EMR-based results delivery shortened results accessibility by 8 days for advanced cancer patients in a community oncology practice. The implementation of EMR-based results delivery significantly shortened the total time from blood collection to results availability, actualizing the quickened turnaround time liquid biopsy testing provides.

In this cohort, the impact of time can be largely, if not entirely, attributable to the EMR-based resulting workflow improvement, given there were no significant differences in turnaround time of the test itself across cohorts, or differences in cancer type or cohort demographics.

Implementing EMR-based resulting may enable clinical decision making in a more timely fashion when liquid biopsy tests are resulted. Additionally, clinicians cite additional benefits of EMR-based reporting, including 1) improved interpretation as test results are largely imported in color rather than scanned, black-and-white results; 2) easier identification of results within the EMR for clinical and insurance purposes; 3) reduction in errors related to dates of test order and/or result.

While this cohort assessed a subset of patients, such time differences applied to a larger oncology population — e.g., 200 to 300 patients per year — may significantly improve the timeliness of oncologic care and reduce preventable delays in clinical decision making. Further studies in The US Oncology Network sites and with a variety of EMR vendors will continue to help validate these findings.

Summary

- **EMR-based results delivery significantly improves timely accessibility to liquid biopsy results.**
- **When liquid biopsy test reports were reported, more patients had results accessible using an EMR-based results delivery approach compared to a manual method.**
- **EMR integration may help address genomic testing delays that can be experienced by oncologic patients.**

References

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