Using a Laboratory Information System Intervention to Monitor and Improve Turnaround Time of Epidermal Growth Factor Receptor Gene Mutation Testing

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Somatic mutations in the epidermal growth factor receptor (EGFR) gene can predict treatment response or resistance to tyrosine kinase receptor inhibitors (TKIs) such as erlotinib, gefitinib, and osimertinib in patients with lung carcinoma. Clinical somatic genetic testing involves complex workflows and high clinical urgency, since results guide clinical management and treatment decisions. Turnaround time (TAT) of testing can be increased by delays in multiple stages of testing, including time to receipt of order from oncology clinics and anatomic pathology, acquiring tissue specimen(s), histology lab processing, and analytical and postanalytical processes. The generation of TAT reports has historically required reviewing paper records that document multiple specimen processing timepoints and manual entry of data into electronic spreadsheets for TAT calculation. This process demanded considerable time from medical laboratory scientists and laboratory directors, and was prone to errors. We implemented a laboratory information system (LIS) process to enable tracking of preanalytical and analytical phases of testing. This process, termed “Molecular Oncology Order Status Tracking” (MOOST), captures 3 key timepoints (requisition received, tissue in lab, and result reported) by adapting laboratory and LIS workflows to record critical data. These timepoints were selected because they are points at which the workflow crosses from one provider or laboratory to another and retrospective analysis demonstrated these transitions can cause delay or are prone to errors. In the 4 months prior to implementing MOOST, mean TAT of preanalytical EGFR testing (requisition received to tissue in lab) was 7.0 days (range 0-21), mean TAT of analytical EGFR testing (tissue in lab to result reported) was 7.3 days (range 2-18), and total mean TAT was 14 days (range 6-28, n = 30). In the 2 months following the LIS intervention, mean TAT of preanalytical EGFR testing was 7.1 days (range 0-16), mean TAT of analytical EGFR testing was 7.1 days (range 1-22), and total mean TAT was 14 days (range 7-22, n = 8). Notably, qualitative assessment of hands-on time required to complete TAT reports decreased after MOOST implementation. Continuous monitoring of EGFR mutation testing is critical for quality improvement and will facilitate TAT benchmarks. In the complex workflow of somatic mutation testing, with numerous potential causes for delayed test results, we describe the implementation of a simple, inexpensive informatics-based intervention. MOOST promotes continuous quality improvement and can improve TAT, a clinically relevant quality measurement that is particularly important in the context of TKI treatment initiation.
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