



Labs and Drugs



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eHealth for Morphology Laboratory Practice

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An overview of the types of errors in clinical laboratories and how the integration of eHealth approaches in routine practice could help reduce them.

Key Points

- At the practice level of morphology, errors can have a major adverse impact on patient care.
- There are different types of errors that can occur in a clinical laboratory.
- These include clinical errors, procedural errors, cognitive errors, and postanalytical errors.
- Errors in the preanalytical and postanalytical phases of testing probably have the greatest potential for serious patient harm.

Clinical laboratory tests and morphology (histology and cytology) diagnoses affect the vast majority of treatment decisions made by clinical physicians in nearly every medical discipline, impacting nearly every person seeking medical care. Many clinical laboratory tests are automated, performed by calibrated machines, reducing factors of human error and subjectivity. At the practice level of morphology, errors that can have a major adverse impact on patient care can occur anywhere in the classic test cycle.

In the preanalytical phase of testing, the morphologist must deal with clinical, specimen delivery, accessioning errors and mistakes due to incorrect specimen handling and inappropriate procedure of morphology laboratory. Clinical errors include the performance of the wrong clinical procedure, ordering of incorrect tests (e.g., inappropriate ordering of a frozen section), and the provision of erroneous, incomplete, or misleading clinical information. Specimen delivery problems include mislabelling of specimens before they reach the laboratory, placement of specimens in the wrong fixative or phlebotomy tube, untimely delivery of specimens, and specimen loss. Accessioning problems include specimen mix-ups at the time of log in, ordering of incorrect tests at accessioning, and computer entry errors. Specimen-handling problems include omission of important tests (e.g., failure to take fresh tissue for flow cytometry or failure to order culture) and ordering of incorrect tests. Errors in the morphology laboratory are

many and varied, and include specimen and labelling mix-ups, undercutting or overcutting of tissue, poor cutting or staining of tissue sections, and cross-case tissue contamination (e.g., floaters). Although out of the direct control of the morphologist, many of these errors can directly contribute to or cause errors that a morphologist (pathologist/cytologist) will make and for which a morphologist (pathologist/cytologist) will be held accountable. These errors can cause very serious patient harm.

Errors in the analytic phase of morphology testing include procedural and cognitive errors in the gross room and procedural and cognitive errors at the microscope. Procedural errors in either venue include specimen mix-up and mislabelling of specimens or blocks and slide mix-ups during dictation of diagnosis at the microscope, that is, dictating a slide to the wrong report. Cognitive errors in the gross room include inaccurate examinations with poor descriptions (e.g., lack of appropriate measurements), lack of or incomplete lesion sampling, and lack of sampling of pertinent areas necessary for proper lesion characterisation or staging. Cognitive errors at the microscope include slips and lapses while analysing slides, poor cognitive formulations, knowledge problems, communication problems (e.g., poorly worded or unintelligible reports), and difficulties in using classification models that have poorly defined criteria.

Furthermore, it should be noted, that the practice of morphology involves the subjective interpretation of objective

data. The objective data, contained in the characteristics of the cells, organisation of tissues, and relationship to the organ on the whole, are preserved for the initial examination on morphology slides, within paraffin blocks, and, more recently in digital image archives. As morphology material is retained in a continuously observable format (the slide or digitised

cycle are probably of the greatest interest to the practicing morphologist because he or she is most directly responsible for and connected to these mishaps; however, it is by no means clear that these error forms fall within the realm of slips and lapses; and because they can be very difficult to detect, errors in the preanalytical and postanalytical phases

The application of eHealth technologies and the introduction of the concept of virtual laboratory in routine practice can be helpful in morphology diagnostics

image), an important method of assessing the quality of morphology services is the use of second opinion “quality assurance” consultation. The consistent utilisation of such consultation to assess and report the diagnostic accuracy, completeness of information (clinical history and reporting of pertinent prognostic features), and consistency of terminology conveyed within each morphology report to clinicians and patients is but one measurement of quality performance in morphology diagnostic.

Errors can occur in the postanalytical phase of morphology diagnostics as well. These include untimely delivery of critical results, delivery of reports to the wrong location, and clinician misinterpretation of the final report. An error of this kind can cause a long delay in the treatment of a serious disease – a delay that can alter or be judged to alter the long-term prognosis of a patient. The error of the postanalytical phase is out of the direct control of the morphologist; they cannot be held legally accountable for it.

It is arguable what kind of errors cause the greatest harm to patients. Errors that occur in the analytic phase of the test

of testing probably have the greatest potential for serious patient harm.

The application of eHealth technologies and especially introduction in the routine practice the concept of virtual laboratory will be helpful in case of the morphology diagnostics. By this large, high quality, clinical databases will become available and be used for healthcare professionals’ communication, distance consultations and education. This approach will facilitate:

- Timely delivery of tests and related reports;
- Analysing the reports, adding special marks for abnormal test results and providing reference values for the particular test without delay.

Therefore, while it may be impossible to completely eliminate errors, it is achievable and possible to reduce them through the integration of eHealth approaches in routine practice.

Conflict of Interest

None. ■