Role of Informatics in Patient Safety and Quality Assurance

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KEYWORDS

• Quality assurance • Quality improvement • Informatics • Patient safety • Surgical pathology

ABSTRACT

Quality assurance encompasses monitoring daily processes for accurate, timely, and complete reports in surgical pathology. Quality assurance also includes implementation of policies and procedures that prevent or detect errors in a timely manner. This article presents uses of informatics in quality assurance. Three main foci are critical to the general improvement of diagnostic surgical pathology. First is the application of informatics to specimen identification with lean methods for real-time statistical control of specimen receipt and processing. Second is the development of case reviews before sign-out. Third is the development of information technology in communication of results to assure treatment in a timely manner.

OVERVIEW

This article discusses the application of informatics to patient safety and quality assurance. It is not possible to write a comprehensive overview in this brief report; instead, this article focuses on recent developments in how informatics is being applied to quality assurance.[1–4]

Quality assurance may be separated into 2 arms. The first is ongoing monitoring to evaluate the extent of possible problems and work to control them over time,[1,2] this is usually divided among the 3 phases of the test cycle. But other monitors of quality assurance include turnaround time (TAT) and customer satisfaction. These monitors do not necessarily relate to patient safety concerns but are important aspects when it comes to the overall success of a laboratory. A list of quality monitors is shown in **Table 1**. The second arm of quality assurance is implementation of tools and changes to help address the shortcomings of any process.

One of the main principles of quality assurance is to identify risk and then try to mitigate that risk.[1,2,5,6] In surgical pathology there are 3 main areas that present risks: first and most significant is the risk of making the wrong diagnosis, second is delivering the result for the wrong patient, and third is somehow not communicating the result (**Table 2**). As such, most quality assurance activities focus on these 3 areas: (1) interpretive diagnoses, (2) specimen identification, and (3) communication of the result. These areas also correspond to the preanalytical (specimen identification), analytical (interpretive diagnoses), and postanalytical (communication of results) phases of the test cycle.

This article addresses the application of informatics in the traditional 3 phases of the test cycle (**Table 3**). This structure is particularly well suited for devising, implementing, and reporting quality assurance monitors. This structure is equally suited for describing the introduction of procedural changes that ultimately lead to improvement of performance.

Currently, most anatomic pathology laboratory information systems (APLISs) are inflexible and lack interoperability.[3,4] This situation makes it difficult to automate much of the data collection necessary to maintain a vibrant laboratory focused on continuous improvement. It is the authors' hope that with newer generations of systems these functionalities will be routinely and easily used.[4]

In an ideal system, it can be imagined what is possible. Specimen processing and reporting in many respects are similar to manufacturing

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Table 1
Quality assurance monitors listed within the test cycle phases and global measures (turnaround time and customer satisfaction)

Quality Assurance Subsections	Monitors
Preanalytical	Specimen identification Specimen integrity Adequate clinical history Accessioning problems
Analytical	Block and slide labeling errors Amended report rate Rate of case review before sign-out Rate of case review for specific organs/ diagnoses Frozen section/ permanent section correlation
Postanalytical	Synoptic reporting and completion rate Report delivery Critical results
TAT	Frozen section TAT Small biopsy TAT Complex specimen TAT Cytology TAT Autopsy preliminary and final TAT
Customer satisfaction (physicians, midlevel providers, administration)	Overall customer satisfaction Component customer satisfaction (TAT, ancillary staff, pathologist, communication) Customer complaints

Table 2
Highest risk areas to address in surgical pathology

Test Cycle Phase	Risk
Preanalytical	Specimen identification[a]
Analytical	Accurate diagnosis Specimen identification[a]
Postanalytical	Communication of results Specimen identification[a]

[a] Specimen identification is primarily a problem of the preanalytical phase but identification problems can occur at any phase of the test cycle.

Table 3
Informatics applications used in surgical pathology and test cycle phase and other functions

Informatics Application	Process
CPOE	Preanalytical
Specimen tracking	Preanalytical Analytical Biorepository Postanalytical Send-outs
Assignment of cases for quality assurance pre- and postanalytical review	Analytical, cytopathology Analytical surgical pathology Analytical autopsy
Monitoring and data extraction	All phases, mislabeling Postanalytical, amended reports Volume indicators TAT
Survey tools	Customer satisfaction
Inclusion of image in report	Specimen identification Analytical diagnostic check
Whole-slide imaging	Analytical case reviews Access for conference cases and clinical correlation Facilitates consultation More accurate staging
Synoptic reports	Analytical report completeness

operations and can be controlled, like most factories, with few differences.

PREANALYTICAL PHASE

The process begins with the acquisition of the specimen; this step is perhaps the most problematic, because in most instances it is well beyond the control of a laboratory. As such, the laboratory has less power to effect change at this step than most others. One of the keys to successfully implementing change to improve specimen acquisition and proper identification requires that pathologists reach beyond the laboratory to clinical colleagues and ancillary staff to help implement change.[7] The application of informatics has a key role.