Enhancing and Customizing Laboratory Information Systems to Improve/Enhance Pathologist Workflow

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KEYWORDS

• Image-embedded reports • Voice recognition • Pre–sign-out quality assurance
• Computerized provider order entry

ABSTRACT

Optimizing pathologist workflow can be difficult because it is affected by many variables. Surgical pathologists must complete many tasks that culminate in a final pathology report. Several software systems can be used to enhance/improve pathologist workflow. These include voice recognition software, pre–sign-out quality assurance, image utilization, and computerized provider order entry. Recent changes in the diagnostic coding and the more prominent role of centralized electronic health records represent potential areas for increased ways to enhance/improve the workflow for surgical pathologists. Additional unforeseen changes to the pathologist workflow may accompany the introduction of whole-slide imaging technology to the routine diagnostic work.

OVERVIEW

The workflow for pathologists constitutes a broad category due to the many roles that surgical pathologists must engage in during a workday. These roles include interpreting histopathologic findings, generating a diagnostic report to clearly convey pathologic findings, communicating critical results when appropriate, ensuring quality of the pathology system, educating future pathologists (residents and fellows), and, when appropriate, having quality assurance performed on the diagnostic findings. To understand various ways that a pathologist's workflow can be enhanced, understanding the practice workflow for pathologists is critical.

Many academic practices and some community pathology practices have converted into a subspecialized sign-out service.[1–3] Several factors are contributing to this trend: (1) increased pressure for consolidation or concentration of hospital services into a centralized center, (2) increasing complexity of the knowledge base, and (3) requests from clinical colleagues for subspecialty expertise. There is variability among how the subspecialization works by practice, with most academic practices having pathologists dedicated to a single subspecialty whereas community practices may rely on subspecialty expertise in a consultative role for specific or difficult cases. A mixture of subspecialty-only pathologists with general pathologists is appealing from a management standpoint because caseload balancing can be readily performed when adjustable pathologist labor is possible, depending on the volume of a particular organ specimen type. With the ongoing health care changes, subspecialty expertise demand is likely to increase in order to deliver higher-quality, outcome-driven health care. Just as pathologists are becoming subspecialized, the clients that pathologists serve have been changing as well.

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Clinical teams have become a mixture of attending physicians who themselves are becoming more and more subspecialized, house staff (fellows and residents), nurse practitioners or physician assistants, nurse coordinators, nurses, and so forth. The secondary team members are sometimes interacting with the pathology department more than the attending physician due to time constraints. Additionally, pathology reports have many different intended audiences—for instance, a surgical resection report is completed predominantly for the operating surgeon, but a primary care physician/oncologist/radiation oncologist (and so forth) may be interested in report content that differs from the surgeon. Additionally, greater transparency of records is demanded by the public, which is leading to surgical pathology reports going directly to the patients themselves. These challenges present an opportunity for pathology to demonstrate its contribution to the clinical team but the solutions often involve balancing various competing needs.

It is within this setting that pathologists must complete the many diverse tasks that are requested of them. Within this article, I discuss several possible ways to enhance/customize surgical pathology workflow. Many of these may be more helpful depending on the clinical practice setup.

VOICE RECOGNITION TECHNOLOGY

Several studies have explored the use of voice recognition technology in pathology with mixed interpretation of the results. One component to consider when looking at voice recognition is the current practice environment. If there is a delay between dictation and completion of reports, voice recognition technology is an attractive alternative. In a system where transcription completes reports quickly, however, the altered workflow associated with voice recognition is not welcomed because there is little gain compared with the prior system. Voice recognition technology is particularly suited to filling in template forms rather than generating a final (free text–based) diagnosis.[4] Henricks and colleagues[4] demonstrated that targeted deployment of voice recognition was cost effective (reduced 2 full-time equivalent positions and payback period was less than 2 years). Kang and colleagues[5] also found that voice recognition technology was amenable to use predominantly for gross description. The use of preprogrammed templates facilitated less text editing of the reports and allowed for greater acceptance.[5] Kang and colleagues[5] discussed several barriers to adoption of voice recognition technology for final diagnosis. These barriers boil down to a lack of standardization in pathology reporting.[5] The pathology department at State University of New York at Stony Brook adopted voice recognition for the complete surgical pathology workflow (from gross description to final diagnosis sign-out).[6] Although not explicitly stated in their study, this group seems to have experienced long turnaround time with their transcription service, and some pathologists submitted handwritten copies of reports to be transcribed.[6] Within this background, the investigators found voice recognition technology a marked improvement, but, despite its improvements over the prior system, some pathologists still used the prior system for report generation.[6]

WORK PROCESSING

Many articles have been written in recent years describing implementation of lean principles based on the Toyota Production System.[7] Other articles also describe efficient processing as the Henry Ford Production System.[8] These systems are largely taken from the manufacturing world. The systems describe changes to the workflow of a specimen of pathology into a continuous flow system. Although continuous flow systems reduce errors and are efficient, some steps in the processing of pathology specimens require batch processing. The biggest batch process for pathology specimen workflow is the specimen processors. Numerous articles have described implementation of continuous process flow to gross processing or continuous flow to slide generation but few if any studies have described a 100% continuous flow specimen processing system.[7–12] This may be because this physically cannot be done. Therefore, the processing of specimen has been turned into a mix of batch and continuous flow processes. Therefore, for a sign-out pathologist, considering an optimal workflow depends on the method for receiving the slide—continuous flow or batch processes. Theoretically, if a pathologist is receiving 1 slide every 10 minutes, then the pathologist can advance that case within a 10-minute window before the next slide comes out. Most departments, however, deliver slides in batches, leading to the pathologist working within a batch processing workflow. This process can include house staff also within the process, which can add another step in batch processing. In the future, with the introduction of whole-slide imaging into the workflow process, continuous flow may be more of a reality than can be achieved in practical terms now. A sample diagram of the workflow from slides leaving histology to report delivery to downstream end users within a pathology department is described in **Fig. 1**. Although continuous flow