Managing Workflow in the Histology Laboratory

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The primary goal in every pathology laboratory is to provide an accurate patient diagnosis in the quickest turnaround time, while ensuring the highest quality of patient care. The goal of the histology laboratory is to provide optimally prepared and stained microscope slides to the pathologist such that an accurate diagnosis can be made, in a timely fashion.

Histology laboratory management teams spend much of their time and effort to ensure efficient workflow of specimens and slides through the laboratory. They must plan staffing around the time frames associated with specimen delivery, surgical grossing, tissue processing, embedding, microtomy, staining, coverslipping, slide check out and slide delivery. The daily workflow plan is based on the premise that (a) all laboratory personnel are present and available to work, (b) all equipment is available and operating and (c) all consumables such as reagents, microscope slides, etc. are available and on hand for use. Any one deficiency in any of these areas can adversely impact not only expected turnaround times, but patient care quality as well.

AUTOMATED HISTOLOGY PROCESSES CONTINUE TO REPLACE MANUAL PROCESSES

Staffing issues have always been present in the histology field. Forty years ago, virtually all histology tasks were performed manually and histologists were developed in-house, using on the job training in an apprentice-style fashion. It seemed that there was always a shortage of good, experienced histologists. With the current emphasis on educated and certified histotechnicians, this shortage continues today. Part of the solution to this problem is the continued development and use of automation in the histology laboratory.

“Dip and dunk” tissue processors replaced manual processing, and were themselves replaced by safer, more efficient closed system tissue processors. Automated slide stainers and coverslippers freed up histologist’s time, which could now be spent on doing more embedding and microtomy. Microtomes themselves became automated; making them safer to use and decreasing cases of repetitive motion syndrome. Even the lengthy and complicated procedures for special stains and immunohistochemistry were able to be automated. All of these developments helped histology laboratories to maximize the skill sets of their histologists while increasing overall laboratory efficiency.

PROPER PLANNING CAN HELP PREVENT EQUIPMENT MALFUNCTIONS FROM ADVERSELY IMPACTING LAB WORKFLOW

However, one of the end results is that the histology laboratory of today is very much dependent upon this automated equipment in order to accomplish the daily workflow goals. When a tissue processor or slide stainer “goes down”, it may adversely impact the laboratory workflow until it is repaired and put back into service.

If back-up equipment is available, the overall turnaround time may still increase if procedures are not in place. One plan would be to partner with vendors that can provide loaner equipment on short notice, in a matter of hours. Vendor partners may also be able to provide repair parts for equipment from global manufacturers on short notice from their own inventory, thereby speeding up the repair process. Thus, it is imperative that laboratory management has systems in place to designate back up procedures when equipment malfunctions, and to have repair personnel on call to remedy the malfunction as soon as possible.

Equally as important, histology equipment must receive daily cleaning and maintenance, as well as annual preventative maintenance, which will decrease the possibility of malfunction. The state, federal (CLIA), College of American Pathologists (CAP) and Joint Commission agencies all have
regulations that mandate the documentation of laboratory equipment maintenance. The tracking, scheduling and documenting of all maintenance, both scheduled and unscheduled, for all laboratory equipment can be a challenging task for any laboratory management team. Vendor partners can be valuable allies in helping to accomplish this task by providing detailed and timely information regarding any and all equipment repairs and maintenance, such that these records are easily available for review by inspection teams that may visit your laboratory at any time. Any or all of the above options are available via equipment service contracts from laboratory equipment vendors.

PROPER INVENTORY MANAGEMENT OF SUPPLIES CAN HELP A LAB’S WORKFLOW EFFICIENCY
Similarly, the laboratory management team must ensure that all reagents and consumables are available to all personnel at all times that the laboratory is in operation. A shortage of any one reagent can have an adverse affect on workflow of specimens and slides through the laboratory, and may even cause a bottleneck that prevents the production of the final microscope slides.

For example, if proper inventory management and controls are not implemented, it is possible that a histology laboratory could run out of coverglass for the microscope slides. Imagine that all processes have been taking place throughout the day, with stained microscope slides ready to be loaded onto the automated coverslipper; only to find that, somehow, the last box of coverslips had just been used. Laboratory management would have to then (a) inform the pathologist staff that slide delivery from the lab was being “delayed”, (b) scramble to beg and borrow coverglass from a colleague and (c) contact the vendor to see how quickly an order for coverglass could be delivered. This is a scenario that certainly would result in an increased turnaround time.

Additionally, if flawed inventory management control causes a shortage or lack of processing reagents, this may cause a tissue processor to be “skipped” on the reagent change out schedule. This could result in the production of paraffin blocks that are sub-optimal and difficult to cut and/or slides that display sub-optimal histology. Now, instead of causing a one-time increase in turnaround time, the quality of patient specimens could actually be adversely affected, subsequently making the diagnosis process more difficult; or worse still – impossible.

COMPATIBILITY OF CONSUMABLES WITH EQUIPMENT IS KEY
Another aspect affecting the management of consumables is compatibility of the supply with the equipment. For example, cassette and slide printers may be manufactured to use cassettes and slides from only one manufacturer. This puts the laboratory's purchasing team at a disadvantage with regard to price negotiations. Similarly, some coverglass may work fine if manually applied – but be ineffective when used in an automated coverslipper. Also, the laboratory may purchase a cassette type or slide that simply does not fit the on-site printer, which may delay turnaround time. It is important for the laboratory management team to work with vendors who are transparent with regard to what restrictions a piece of equipment may have with regard to the consumable that fits it.

PROACTIVE INVENTORY MANAGEMENT STRATEGIES ARE A MUST
Clearly, laboratory management must be proactive in their handling of inventory management. Being reactive in these cases can be the cause of a decrease in patient care quality and/or an increase in expected turnaround times. Laboratory management must make use of “standing orders” for the basic histology consumable products such as
cassettes, slides, coverglass, stains and reagents. Amounts of consumables necessary to operate the laboratory on a weekly and/or monthly basis must be calculated and communicated to reliable vendors, who can ensure timely delivery of items, without backorders. These orders may need to be adjusted up or down on occasion, but at least laboratory personnel will know when to expect shipments of critical supplies.

An integral part of inventory management is the requirement for someone to pay attention to critical laboratory supplies on a daily basis. Using a specified time window each day, designated personnel should perform a quick inspection of the laboratory flammable cabinets, slide storage areas, etc. to determine if there are any impending shortages of supplies. Any shortages should be recorded and communicated to ordering personnel. The loop is closed when the ordering personnel alert staff that a particular order has been placed, and when the expected delivery date is.

An additional inventory management strategy is to designate an “emergency” storage area within the laboratory. A small flammable cabinet containing critical reagents, along with shelves that contain amounts of microscope slides, coverglass, microtome blades, etc. can be invaluable if a temporary shortage occurs. Obviously, these items are replaced immediately if they are used, in preparation for the next emergency shortage.

These proactive tasks and actions will help to head off any issues regarding potential shortfalls in inventory and supplies. However, they will come at a cost. Designated laboratory personnel need to be trained, and then assigned to spend time on these tasks. This is time that could be spent on performing tasks related to slide production. Each laboratory needs to weigh the potential benefits from such an assignment of personnel against the re-assignment of designated personnel to non-slide making tasks.

THE IMPORTANCE OF WORKFLOW MANAGEMENT
In conclusion, workflow management in the histology laboratory should result in the elimination of downtime due to equipment failure, the maximization of resources, increased productivity and a simplification of laboratory processes – all while maintaining the highest patient care quality available.

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Clifford Chapman has over 40 years experience managing both private reference and teaching hospital pathology laboratories in the Boston area, including Massachusetts General Hospital, Pathology Services, Children’s Hospital Boston, and StrataDx.

He also has over 25 years experience presenting lectures, workshops, teleconferences and webinars at the local, regional and national level for the Massachusetts Society for Histotechnology, Region I Histology and National Society for Histotechnology.

Clifford is a specialist in histological techniques, quality management, laboratory workflow and laboratory safety. He is an author and co-author of over thirty scientific publications, including his most recent book “Dermatopathology Laboratory Techniques”. Clifford is currently the Technical Specialist at StrataDx and works as a consultant at Medi-Sci Consultants.