

The Association of Departmental Quality Infrastructure and Positive Change: A Pathology Department Illustration

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Abstract

A vertically and horizontally well-integrated quality improvement team is essential for effective quality data collection and implementation of improvement measures. We outline the quality structure of a large academic pathology department and describe successful projects across multiple divisions made possible by this tightly integrated structure. The physician vice chair for quality organizes departmental quality efforts and provides representation at the hospital level. The department has an independent continuous quality improvement unit and each laboratory of the department has a staff quality improvement representative. Faculty and staff experts have interacted to produce improvements such as accurate container labeling, efficient triage of specimens, and reduction of unnecessary testing. Specialized task forces such as the Courier Task Force are producing concrete recommendations for process improvement. All phases of pathology patient care are represented by faculty and staff who are trained in quality improvement, and each position touches and communicates actively with levels above and below itself. The key to the department's approach has been the daily attention to quality efforts in all of its activities and the close association of faculty and staff to accomplish the goals of greater efficiency, safety, and cost savings.

Keywords

infrastructure, laboratory, patient safety, quality assurance, quality improvement

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Introduction

The recent Institute of Medicine report “Improving Diagnosis in Health Care” points out the importance of pathology and the pathologist in fostering teamwork in the diagnostic process and in providing feedback on the quality of health care. The importance of benchmarks, dashboards, and improvement planning has long been well recognized by pathologists because of the regulatory requirements of the work and the service orientation of the discipline. For example, in the area of transfusion medicine, pathology has developed successful model systems of quality and safety. Though much of pathology does not involve direct contact with the patient, a model of a “physician client,” whose goals of care and satisfaction may be regarded as similar to those identified in direct care of a patient, has been highly useful in developing a robust quality environment.

Infrastructure is key to the implementation of quality improvement. In particular, a quality improvement team comprising of faculty and staff is essential to effective quality data collection and to the development and implementation of improvement measures. In addition, members of the pathology quality structure must learn from and interact with each other, other departmental quality programs, and report to

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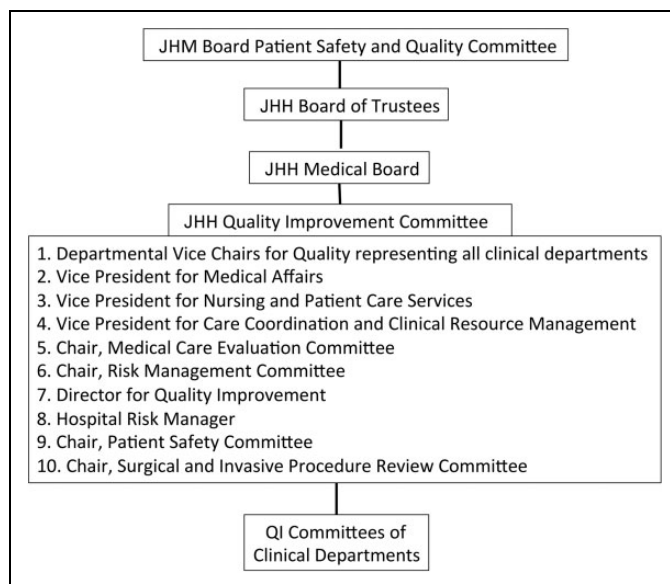


Figure 1. Health system-wide quality improvement structure.

hospital-level quality leadership. Yet in many health systems, this quality structure is underdeveloped. In a previous paper, we have described the quality structure for Johns Hopkins Medicine (JHM), a large academic health system.¹ Here we outline the quality structure of a large academic pathology department at Johns Hopkins Hospital (JHH), detailing the parallel physician and staff involvement and interaction in making the structure successful. We then describe *key projects* which this integrated structure has made possible. Though in many hospitals the quality structure may not be as expansive or intricate as at JHH, the successful templates and methodologies described here may be utilized in many different structures and settings, in part or as a whole.

Hospital Quality Structure

In the quality improvement structure presented here, the hospital-wide quality improvement committee reports to the hospital medical board and the board of trustees and is currently chaired by a member of the department of medicine (Figure 1). This committee meets monthly and governs policy pertaining to clinical practice, monitors multiple quality indicators spanning clinical departments, and develops system-wide utilization reviews. Other quality committees with cross-departmental membership reporting to the hospital quality improvement committee include patient safety, service, and regulatory compliance.

It should be noted that while at JHH the title “director” is actually used for the head of the department, for clarity we will use the more general term “chair” and “vice chair” to avoid confusion with staff positions which are also referred to as directorships. To help nurture the departmental quality structures, the health system created a role of vice chair for quality for most departments.¹ The physician vice chairs for quality organize departmental quality efforts and provide

representation for each clinical department at the hospital quality improvement committee. Additionally, in this environment a special central organization entity, the Armstrong Institute, was created to coordinate quality efforts across the health system, deliver training, and foster scholarly work in patient safety and process improvement.

Pathology Department Quality Structure

The pathology department chair has appointed 5 physician vice chairs, including a vice-chair for quality, patient safety, and service (the other vice chairs include clinical affairs, education, personalized medicine, and research). While a separate physician advisor maintains jurisdiction over matters of faculty credentialing and training, the vice chair for quality interacts with day-to-day matters in the laboratories. Both physicians attend hospital-wide meetings and report through both the normal departmental chain of command and the hospital-wide quality structure. Most importantly, the vice chair for quality attends weekly core leadership meetings with the chair and other vice chairs, bringing a continuous improvement perspective to discussion of issues such as faculty recruiting and development, space utilization, and implementation of new technologies. The vice chair for quality also meets monthly with the vice chairs for quality from the other clinical departments and with hospital quality leaders.

Pathology Divisions and Functional Units

Anatomic and clinical pathology at JHH are divided into divisions, each of which has a physician head and a staff manager. Some large divisions are further subdivided into “functional units” for quality monitoring purposes (Figure 2). Each division or unit has a staff member quality improvement representative, which in the case of smaller units may also be the manager of the division. Areas which have independent staff quality representation include surgical pathology, core laboratory, immunology, transfusion, hemapheresis and microbiology. Smaller community affiliate hospitals within JHM each have a single quality representative who interacts with the larger JHM system. All quality improvement (QI) representatives system-wide meet monthly in person or on a conference call to review significant hospital reported events as well as other issues. This allows for shared expertise, a more uniform response to issues, and fosters a cross-pollination of ideas.

Pathology Clinical Quality Management Unit

In addition to the “in the trenches” unit quality managers, the department of pathology also has a separate and independent quality unit with a staff director of clinical quality management who is involved with all aspects of quality across the department. This staff leader supervises an independent pathology continuous quality improvement (PCQI) group of 6 individuals including 3 quality assurance (QA) specialists, 2 quality assurance technologists, and 1 administrative

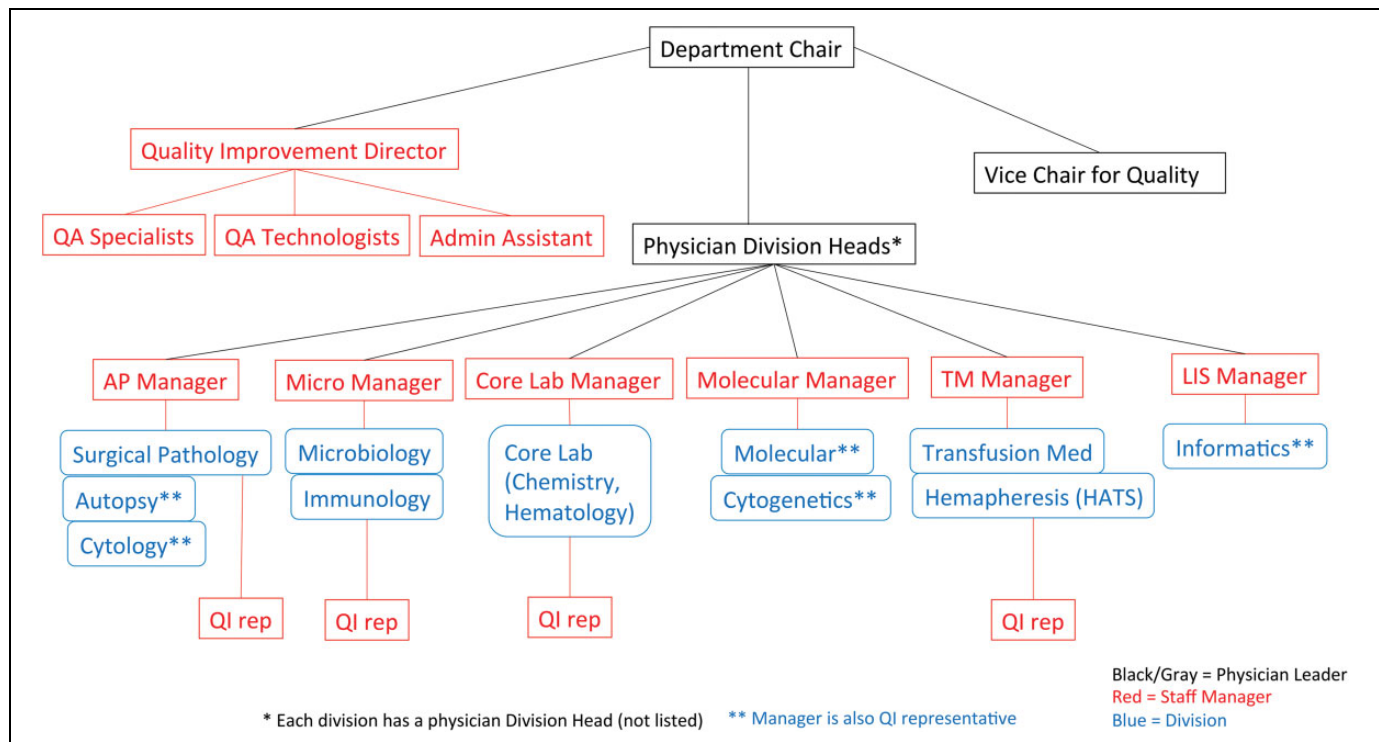


Figure 2. Pathology department quality improvement structure.

assistant. The PCQI staff are separate from the functional unit quality representatives.

Similar to the parallel way in which physician division heads (faculty) interact with divisional managers (staff), the vice chair for quality and the PCQI director work closely together on departmental quality matters, each bringing their unique perspectives to bear on quality problems confronting pathology. The PCQI provides support and oversight for such activities as federal and state regulatory requirements, accreditation inspections and requirements, proficiency testing and external quality assessment programs, laboratory health and safety, safety event reporting and data analysis, departmental performance indicator monitoring, emergency management, business continuity, process improvement activities, online document and policy control, and continuing education. The QI representatives from the PCQI office also liaise and facilitate process improvement activities between pathology and other clinical units, such as identifying and addressing training needs for those collecting laboratory samples and specimens. The PCQI staff also participate in many hospital-wide and departmental committees such as the emergency management committee, regulatory compliance committee, quality and safety clinical committee on policies, the laboratory advisory committee, and the pathology QA work group.

Departmental Performance Improvement Committee

The pathology department holds monthly performance improvement committee (PIC) meetings, chaired by the physician vice chair for quality, which includes QI representatives

and leadership from throughout the department, information technology (IT), financial staff, and invited visitors. This meeting agenda is structured utilizing 4 core functions: regulatory compliance, patient safety/risk, patient-centered care, and enhancing value. A work group meeting of QI representatives, chaired by the vice chair for quality (physician) and director for clinical quality (staff), is held in advance of this meeting to review all sentinel events and to examine trends including events with lower harm scores. A subset of these significant reported events is brought to the PIC meeting for review. Each functional unit gives a presentation at the PIC annually, providing an overview of the work they perform, challenges, and quality projects. This has enabled cross-pollination among diverse units and laboratories and contributed to discussion of positive as well as negative outcomes. The overall “fractal” structure (parts holding the same character as a whole), used throughout the JHM system quality structure, provides horizontal connections among divisions for peer learning and vertical connections for accountability.²

Results of Quality Structure: Patient Safety and Experience

An important example of the type of collaborative project enabled by the multilevel pathology department QI structure is the Courier Task Force assembled to address problems in critical specimen transit in the expanding health network, particularly for microbiology (Table 1). Although the Johns Hopkins Bayview Medical Center hospital was already a part of the JHM system, over time 3 additional affiliate hospitals (Howard

Table 1. Patient Safety and Experience Outcomes.

Item	Objective	Measures Implemented	Results
1	Improve TAT to within 4 hours for CSF specimens from affiliate hospital.	Additional courier runs added (Courier Task Force). Education on STAT couriers. Techs at affiliate institutions taught to read Gram stains.	Increase from 20%-30% to 80%-70% TAT within 4 hours. Working on telepathology Gram stain consultation.
2	Improve accurate labeling of primary and secondary reagent containers.	Online and in person education. Spot audits incorporated into regular safety walk-throughs.	98% compliance achieved in first half of 2017.
3	Ensure safety of outside visitors to autopsy.	Visitor policy established with HIPAA release. Personal protective equipment guidelines posted and reviewed.	30 visitors to autopsy with no adverse events.
4	Include molecular and cytogenetics in departmental monitoring.	The TAT for leukemia and prenatal diagnostic panels added to departmental dashboard.	12/12 months met target. 11/12 months met target.
5	Improve rapid assessment of diabetes.	STAT HgA _{1c} added to Emergency Department test panel.	Increase from <10% to 80% analyzed in 180 minutes.

Abbreviations: CSF, cerebrospinal fluid; HIPAA, Health Insurance Portability and Accountability Act; TAT, turnaround time.

County General Hospital, Suburban Hospital, and Sibley Memorial Hospital) were added to a large consolidated system ranging in distance from 4 to 42 miles from the main medical campus. Concerns arose about the impact of delays from these remote locations on the transportation of fragile specimens such as cerebrospinal fluid (CSF) and any impact that delayed entry of blood culture bottles might have on detection of bacteremia. For example, in May 2015, for Bayview, the mean time from collection to arrival in the JHH laboratory for blood cultures was 3.62 hours with a range from 48 minutes to 24.32 hours; while for the Howard County hospital, the mean time from collection to arrival at JHH was 5.39 hours with a range from 91 minutes to 18.97 hours. Satellite laboratories were found to be properly placing specimens for prompt pickup by couriers at this time and so delays did not appear to be created internally.

The departmental vice chair for quality chaired a Courier Task Force that consisted of 16 members including physician and staff laboratory directors, managers, supervisors, and customer service representatives with at least 1 member participating from each of the affiliate hospitals. Actual specimen transport data were manually collected from the Laboratory Information System (LIS), with microbiology selecting CSF for study due to the special sensitivity and manageable volume of specimens. Data show that both white blood cells and microbes in CSF deteriorate within a 4-hour period.³⁻⁵ Specific indicators to examine were determined in a collaborative “brainstorming” session by the task force and a 1-week time period of focused study was decided upon. Selected indicators for microbiology were collection date, collection time, receipt in sending lab, courier pickup and drop-off times, and microbiology received and plate time. Examination of the data revealed that in-laboratory processes were not creating delays from the satellite hospitals. Also, it was clear that delay in specimen pickup from certain of the outlying sites and long transit times also did not necessarily stem from greater geographic distances. The reason for the longer transit from some sites that were often actually closer was because couriers frequently made intervening pickups and routine runs to ancillary

clinics during specimen transportation, while carrying the more time-sensitive specimens from other hospital sites. It was also discovered that not all affiliate hospitals had the same number of courier runs.

After significant study and discussion, the primary recommendations made by the Courier Task Force were to (1) increase the courier pickups at Howard County General Hospital to match the number of times for Bayview Hospital, (2) encourage Suburban Hospital to request STAT couriers for sensitive specimens such as CSF, and (3) recommend regular hospital-only courier runs be instituted with no intervening pickups at other sites. After implementation of the task force recommendations, turnaround times for CSF specimens increased from 20% to 30% receipt within the target of 4 hours to 70% receipt within target.

Another significant opportunity for improvement was identified during interim self-inspections of multiple laboratory areas: accurate labeling of both primary and secondary containers. After discussion in the PIC group, an online and in-person education program on this topic was developed by staff within the core laboratory and disseminated to the different lab areas. Then, spot audits were incorporated into regular safety walk-throughs performed by the continuous quality improvement (CQI) office staff. As a result, 98% compliance was achieved in the first half of 2017.

A discussion of an incident involving a visitor fainting in a “brain cutting” educational session led to the discovery that there was no specific policy for tracking outside visitation to the autopsy suite. A policy was established guided by official Health Insurance Portability and Accountability Act (HIPAA) releases and an official visitor log was created. Guidelines for hydration requirements and use of proper personal protective equipment were developed, posted, and reviewed with the hosting neuropathology fellows. No further incidents occurred during 30 subsequent visitations to autopsy.

For the first time in the past year, quality measures for molecular pathology and cytogenetics were added to the departmental dashboard where previously these divisions had not been represented. Turnaround times of leukemia and

Table 2. Quality Performance and Value Outcomes.

Item	Objective	Measures Implemented	Results
1	Increase utility of report card measures and avoid multiyear repeats of achieved targets.	Graduated 2 to 3-year cycle of SMART measures.	Three new divisions participating; 11 of 15 new measures for 2017. More improvement in measures monitored.
2	Ensure microbiology specimens for molecular testing are routed properly.	Restructured triage areas, workflow, and tracking methods for specimens.	Lost specimens reduced from several per day to none.
3	Enable sampling of fetal blood in labor and delivery.	Mobile hematology counting service created for monitoring of fetal blood.	Used 20 times in 2017 with highly positive comments.
4	Reduce use of nonsensitive or inappropriate stool parasitic testing.	Algorithmic approach to test ordering with prompts in EMR implemented. More sensitive nucleic acid testing used.	Testing volumes decreased from over 1000 to 200s and positivity rates increased from <2% to 5%.
5	Facilitate outreach between pathology and other departments.	Core laboratory participated in department of medicine annual nurses review.	Drop in uncollected specimens from department of medicine.

Abbreviations: EMR, electronic medical record; SMART, specific, measurable, attainable, and relevant.

prenatal diagnostic panels reached the target (over 95% resulted within 14 and 21 days) for 12 of 12 months and 11 of 12 months, respectively. Rapid assessment of diabetes was improved by the addition of a STAT hemoglobin A_{1c} (HbA_{1c}) to other tests available in the emergency department, resulting in an increase from less than 10% of specimens analyzed within 180 minutes to 80% analyzed within that time. Plans are in place to increase to continuous 24-hour availability for HbA_{1c} testing by the winter of 2017.

Results of Quality Structure: Quality Performance and Value

The pathology department maintains a “quality indicator report card” to monitor new departmental quality and safety initiatives and to process improvement activities (Table 2). The physician vice chair for quality and staff director for clinical quality recently examined all report card measures and determined that some measures were remaining on the report for multiple years after having met target while others were items that were not improvable by pathology department actions. Given this, a new policy was created to provide a standardized approach to metric development that included a checklist for labs to follow to ensure the metric met the required standards. This policy now includes a time line for the “lifetime” of a report card measure.

For quality indicators to be accepted for inclusion in the report card, they now must fulfill the following criteria:

- be identified under 1 of the 6 JHH strategic priorities,
- be an improvement opportunity to correct a defect, save money, or improve patient safety and/or service quality,
- be a new indicator (not present on the report card previously),
- be a previously presented indicator that:
 - now has a tighter goal,
 - has had significant changes to the indicator,
 - is requested by hospital or departmental leadership to remain, or
 - is moving from the improvement to the maintenance phase.
- follow the SMART goal format (specific, measurable, attainable, and relevant).⁶

Each indicator or metric is developed using a worksheet created by the PCQI office that provides laboratories and other units with guidelines and a framework to develop the metric. The report card is presented at the monthly departmental PIC meeting and the progress of each measure that is currently falling short of target is discussed with each area in a future-oriented nonpunitive manner. As a result of the new SMART measures, 3 new divisions have commenced report card monitoring and 11 of 15 measures for 2017 were added to the report card. Measures monitored have shown greater improvement through the year than previously.

A review of hospital reported adverse events revealed that microbiology specimens for molecular testing were not being routed properly and some specimens were being lost in transit, particularly from Bayview Hospital. In cooperation with a department-wide Specimen Loss Task Force, the microbiology division restructured the specimen triage area, instituted barcoding for sample shipments, and created daily sample reports at Bayview for immediate follow-up on samples not resulted at JHH. These measures have reduced specimen misplacement from several per day to none.

Also in microbiology, innovations were made to reduce inappropriate use of parasitic stool testing. An algorithmic approach to test ordering was developed and launched, including prompts in the electronic medical record (EMR) with the assistance of IT staff and the simultaneous implementation of more sensitive nucleic acid testing. Testing volumes decreased from over 1000 per month to 100 to 200, while positivity rates

Table 3. Ongoing Quality Projects.

Item	Objective	Measures Implemented
1	In advance of new Laboratory Information System, evaluate processes in surgical pathology.	Task force formed including faculty cochairs, vice chair for quality, managers, and staff to study processes and workflow.
2	Increase efficiency and patient satisfaction in phlebotomy.	Service reorganized from individuals taking calls to zoned hospital system with specific technicians in designated areas and time intervals.
3	Encourage resident and fellow participation in quality activities.	New quality improvement/patient safety concentration instituted for 2017.

increased from less than 2% to 5%. This project met the dual goals of both cost savings and improved patient care. Finally, the core laboratory presented guidelines on specimen collection and labeling at the annual department of medicine nurses review. Along with other measures, this educational exposure has resulted in the reduction of “uncollected specimens” (specimens not logged into the EMR correctly and thus not able to be tested in the laboratory).

Discussion—The Future

Having an infrastructure that integrates physician and staff quality experts closely with functional units and with the hospital quality structure enables the swift identification of problems and harnesses cooperative knowledge to redirect efforts and implement change. New projects have been initiated from both the faculty and staff sides and the benefits from the close and continuous cross talk between participants of different levels are being realized (Table 3).

A Surgical Pathology Task Force to study the complex workflow of that unit has been assembled. It is chaired by 2 pathologists (1 a surgical pathologist) and includes the vice chair for quality and the staff director of CQI as well as managers and senior staff from all functional units in surgical pathology (accessioning, grossing, histology, immunohistochemistry) as well as a nurse liaison from the operating room. Thus far, workflows have been mapped and focus groups created for each pathway with the goal of identifying up to 3 or 4 major opportunities for change. The work of this task force is particularly important as anatomic pathology is anticipating adjusting to a new LIS in the next 3 years or so. Another recent initiative has been the reorganization of phlebotomy from individual laboratory technicians taking calls hospital-wide to a zoned approach with specific technicians in designated areas and draws at specified intervals. This has already reduced nighttime draws and shown a corresponding rise in patient satisfaction scores. Finally, as a part of department-wide efforts to involve residents in quality improvement, a new study

concentration has been created in quality improvement/patient safety that includes didactics, hospital meeting attendance, and a capstone thesis project for residents who choose to participate. The track will enable residents to contribute skills in quality improvement to future employment and to their own personal practice of medicine. Finally, participation of the pathology faculty in quality projects has been incentivized by assigning points that count toward a salary bonus and the vice chair has become a resource to guide the design of quality improvement projects. A yearly award for the best resident quality project has also been instituted with good response.

Innovative Features of the Program

There are 4 factors that differentiate the JHM quality improvement system from nearly any other in the country and produce the tight integration that is its hallmark. First, there is quality improvement leadership at the highest administrative levels of the hospital and these leaders actively guide and monitor system-wide policy, reporting to the board of trustees. Second, mirroring the actions of top hospital leadership, faculty-level vice chairs for quality (including pathology) act as quality leaders at the department level and bring considerations of process improvement to all discussions and decisions at that level, as well as carrying departmental priorities down to the staff committees who are in charge of implementation. Third, the department of pathology possesses a centralized continuous quality improvement office that functions as a full-time quality presence for the department, and fourth, the CQI office staff interact directly with functional unit quality staff in day-to-day operations. All phases of pathology patient care are covered by faculty and staff who are trained in quality improvement and each position touches and communicates actively with levels above and below itself. Though this type of complete full staffing is only possible with a certain level of resources, the approach of establishing key personnel at every level of work is one which can be adapted across settings. The key to JHH's approach has been the daily integration of quality efforts with the ongoing work of the department and the close involvement of faculty and staff to the goals of greater efficiency and safety and cost savings.

Declaration of Conflicting Interests

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