

# QUALITY MANAGEMENT (QM) PROGRAM

## Laboratory of Pathology: 2024

### Purpose:

The Quality Management (QM) program is designed to continually evaluate the quality of clinical services generated throughout the Laboratory of Pathology (LP). This is accomplished by: monitoring and evaluating quality improvement indicators for the LP; ensuring continuous compliance with quality control and preventative maintenance policies by LP sections; addressing quality outliers and incident reports (addressing system issues); and ensuring all LP Clinical Sections are in compliance with the College of American Pathologists (CAP) standards and guidelines to ensure compliance with the Clinical Laboratory Improvement Amendments (CLIA-88) statutes that govern clinical laboratory medicine. The LP QM Committee oversees the program.

### General Requirements

The QM program is an LP-wide initiative and quality indicators and reports cover all clinical areas. According to the College of American Pathologists, Lab GEN Checklist, v. 10/24/2022, the laboratory must have a written quality management program to systematically ensure the quality of laboratory services. In laboratories that are part of a larger institution (e.g. a hospital), the laboratory quality management program must be integrated with the institutional program. In accordance with the CAP standards, GEN.13806 (a quality program), GEN.20100 (QM Extent of Coverage), GEN.20208 Non-conforming events include problems such as errors and incidents that may interfere with patient care/client services), and GEN.20316 (Quality Indicators), the laboratory has a written quality management program that covers the extent of all clinical services and establishes policies and procedures to identify and evaluate errors or issues that may interfere with patient care, and the QM program includes monitoring key indicators of quality in the pre-analytic, analytic, and post-analytic phases.

A list of indicators is provided below. Some clinical sections can opt to devise additional QI plans to monitor and document a set of relevant indicators based on their section's regulatory standards (e.g. CAP standards for turnaround times). Indicators for individual sections' quality reports should include pre-analytical, analytical, and post-analytical variables.

### QM Plan Overview

- All clinical sections are given the opportunity to report their section-specific quality plans and subsequent end-of-year reports to QM Committee to share quality initiatives across clinical sections.
- In addition to the annual report for these sections, General Anatomic Pathology (AP): Autopsy and Histology Laboratory's QA Sheets, and LP and the Clinical Center's Environment of Care will be reviewed during each QM Committee meeting.

(Histology is the primary clinical processing laboratory, therefore monthly monitoring of quality issues is important to report to QM committee).

- Improve identification, communication, and correction of errors in a timely manner. Specific criteria approved by QM Committee require that all sections establish and define any incidents/complaints to address, monitor and report to QM Committee on a monthly basis. The objective is to identify and resolve

consistent or recurrent complaints or incidents that affect all LP clinical laboratories. Action items will be addressed by the QM Committee.

- The QM program must include a process to identify and evaluate errors, incidents and other problems that may interfere with patient care services (GEN.20208). LP staff have several mechanisms to identify and report any quality issues or concerns: a) LP currently participates in the Clinical Center's Occurrence Reporting System (ORS), Safety Tracking and Reporting System (STARS) <https://stars.cc.nih.gov>, which is a mechanism to report hospital-related incidents to Clinical Center clinicians, nurses, and allied health professionals; b) LP's internal Incident Reports, where LP staff reports internal and/or external quality concerns to the QM committee or Clinical Manager; and c) the Clinical Center has adopted a 'Morning Huddle' at 08:20 each weekday morning, which is attended by each clinical department, nursing unit representatives, and support service representatives and is a forum for any healthcare professional to report on concerns that may benefit from other hospital departments.

### **Method of Implementation**

The LP QM program will be devised and monitored by the QM committee. Indicators to be monitored and reported include pre-analytical (e.g. number of cases without requisitions), analytical (e.g. turnaround time for SI and SB cases), and post-analytical (e.g. number of revised reports). Detailed specifications for the LP QM program and AP QI plan are listed below. The QM committee recommends that each laboratory/ section/ unit devise and monitor quality indicators specific to their discipline. The section's QM plan should improve patient safety and the quality of services provided by LP. Although a formal written and verbal report will not be required, updates on individual efforts to improve patient safety and quality of services will be requested by the QM committee.

The QM committee will monitor the process related to patient safety (CAP and JCAHO Laboratory Patient Safety Goals) on an annual basis. The committee will utilize several parameters in this process including the annual QM reports from the required LP laboratories/units/sections; outcomes of events reported to the QM committee via QI tracker/QI log or directly to either the QM committee chair or Clinical Lab Manager; participation of QM committee chair in the Surgical Administrative Committee (SAC); and reporting of relevant LP QM findings to Clinical Center/NIH office(s) involved in patient care and safety.

The QM committee will monitor the process related to occupational injury/illness in the LP at least on a quarterly basis. Each Unit/Section/Laboratory will submit all OMS reports to the Clinical Laboratory Manager. The OMS reports must not contain any personal identifiers. The OMS reports will be reviewed by the Clinical Laboratory Manager and reported to the QM committee to identify any common issues that could potentially impact other LP Units/Sections/Laboratories.

### **General Requirements of the QM Committee**

The QM Committee will meet to review the effectiveness of the QM program and to follow-up on any corrective actions taken. Minutes of each QM Committee review will be generated to document the effectiveness of the QM program and to include any recommendations made to improve the QM program. However, overall review and approval of the QM program is the responsibility of the Laboratory of Pathology's Medical Director.

The QM Committee will include: (1) the Chief or Deputy Branch Chief of the Laboratory of Pathology; (2) the QM Committee Chairman (a physician representative), (3) the Clinical Manager, QM Co-Chair, (4) the LIS Administrator, (5) a representative from each LP laboratory/unit/section, (6) clinical faculty – attending pathologists, and (7) members of the AP residency and clinical fellowship programs.

All pathology residents onsite are expected to attend QM committee meetings for the purpose of providing educational experience and an opportunity to contribute to the ongoing improvement efforts of the QM committee. Hematopathology and Cytopathology fellows will attend the QM committee meetings as "guests" with the purpose of providing an educational experience with issues related to quality assurance, quality improvement and quality management.

# PROCEDURE FOR IMPLEMENTATION OF QM PROGRAM

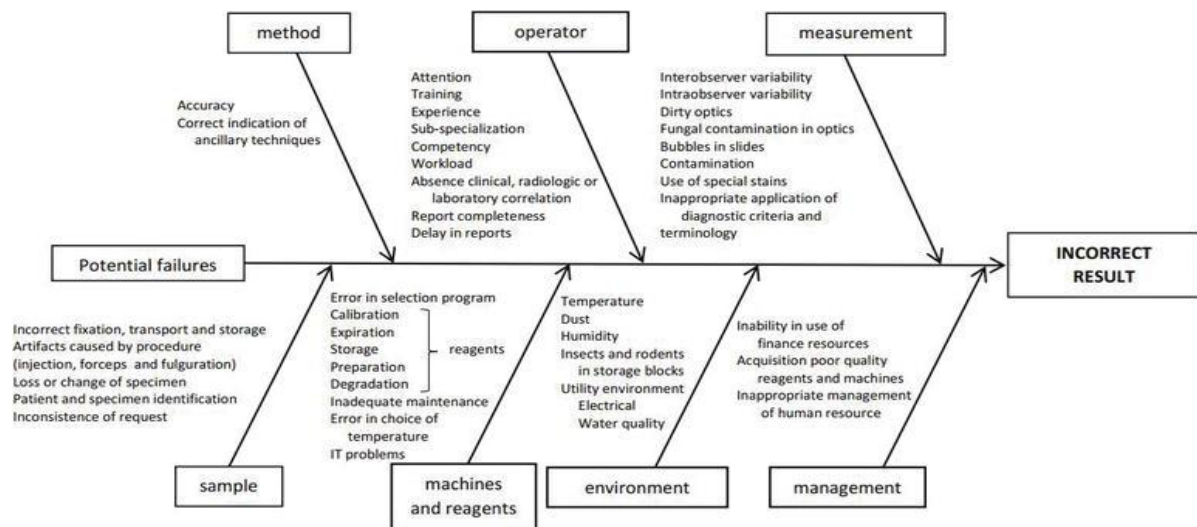
## Laboratory of Pathology: 2023

### Defined Laboratory/Unit/Section Heads and 2023 QM Committee Representatives:

Frederic G. Barr, MD, PhD, Medical Director  
 Kenneth Aldape, MD, Branch Chief (Ex-officio Member)  
 Armando Filie, MD, QA Chair, Cytopathology  
 Joseph Chinquee, DHSc, MBA, MT(ASCP)DLM, Clinical Manager  
 David Kleiner, MD, PhD, Autopsy  
 Elaine S. Jaffe, MD / Stefania Pittaluga, MD, PhD, Hematopathology  
 Hao-Wei Wang, MD, PhD, Flow Cytometry  
 Markku Miettinen, MD / Armando Filie, MD / Patricia Fetsch, CLS(ASCP) Immunohistochemistry  
 Markku Miettinen, MD Surgical Pathology  
 Liqiang Xi, MD / Kenneth Aldape, MD NCI-COMPASS Program  
 Martha Quezado, MD, Residency Director / Deputy Head of Surgical Pathology  
 Michael Newford, DHSc, HTL(ASCP) – Deputy Clinical Manager / Histology Supervisor  
 Victoria Lumelski, BS, Quality Assurance / Regulatory Compliance Specialist

The Section Head, Technical Director or Chief Medical Officer for each LP laboratory/section/unit is responsible for establishing section-specific quality plans and for overseeing the section’s overall quality plan and indicators. Each plan should include at least one pre-analytical, one analytical and one post-analytical indicator. Suggested indicators are listed below (indicators marked with [\*] are related to patient safety). For each indicator monitored, the following should be documented:

- (1) **Goal/Threshold...**What is the goal for the monitored indicator? For example, for specimen adequacy, what constitutes an adequate (or inadequate) specimen? An indicator for specimen adequacy might be *tissue viability*. The Goal/Threshold for an adequate specimen might be “viability of sample should exceed 40%.”
- (2) **Events not meeting goal/threshold...**For each indicator, raw data is collected monthly and events not meeting goal/threshold may require further investigation. Using the above example, all samples with viability below 40% are documented.
- (3) **Perform Risk Assessment using Fishbone Diagram for Significant and/or System Errors...**



Santana & Ferreira, 2018

(4) **Corrective action taken**...Corrective actions should include both **reactive** and **proactive** actions. Using the above example, contacting the physician who obtained the sample to report problems with viability would be a reactive action. Proactive action might include sending out an annual memo to physicians instructing them how to procure samples with the best possible viability.

Notes: **Investigation of Non-conforming Events**... For a non-conforming event that results in death, permanent harm, or severe temporary harm (e.g., sentinel events), a root-cause-analysis must be performed and peer-reviewed during the following month's quality management committee meeting. Non-conforming events that represent a risk to patients, employees or health and safety of the general public, but are not sentinel events (e.g., near misses), must be investigated and reported to the quality management committee. Non-conforming events will be reported by LP's QM Chair to the NIH Clinical Center's STARS Program.

### **Suggested QI Indicators**

*Section quality indicators should include pre-analytic, analytic, and post-analytic variables. Monitors should incorporate elements to identify areas for improvement with patient safety issues and improve the accuracy of results reported on our patients.*

#### *I. Specimen adequacy*

To generate excellent data for patient care, specimens analyzed must be adequate and appropriate for analysis. Each chief/director should address the issue of what determines an adequate/appropriate specimen for his or her respective service (goal).

#### *II. Appropriateness of test(s) ordered.*

When relevant, are the tests ordered appropriate? For example, a daily order for cytogenetics on bone marrow biopsies for the purpose of monitoring minimal residual disease is inappropriate.

#### *III. Turnaround time\**

When relevant, what is the acceptable turnaround time for a given test/analysis?

#### *IV. Patient/Specimen Identification\**

This indicator will include identification errors with specimens submitted by nursing/medical staff, labeling errors (or unlabeled specimens) received in the lab; misspelled or incorrect demographics on specimen or requisition labels; and laboratory labeling errors to include blocks, slides, or records.

#### *V. Test Order Accuracy*

Percent of test orders correctly entered in the laboratory information system.

#### *VI. Revised Reports\**

Percent of reports that are revised - relative to the total workload. For example, total revised reports for routine small biopsies that impacted, or had the potential to impact patient care, are important to monitor.

#### *VII. Quality Control / Preventative Maintenance Review*

To ensure staff perform required test quality control procedures and preventative maintenance as required per standard operating procedure.

## **2024 QM Program - AP QI Plan Method of Implementation:**

### **Specific Requirements**

The Quality Management program includes monitoring key indicators of quality in the pre-analytic, analytic, and post-analytic phases (GEN.20316). These indicators aim to monitor activities critical to patient outcomes or that may affect patient care. Although the CAP does not mandate specific indicators, the LP QM program has adopted some of the key quality indicators that are commonly used to measure laboratory performance in a consistent manner and that are important to clinicians and patients as indices of care (e.g. specimen identification, customer satisfaction, and corrected reports).

These QI indicators are reviewed/approved annually for effectiveness by the Medical Director. The plan for each indicator is listed on the monthly reports and updated as necessary by the committee. Actions taken if goals are not met will be documented in the minutes. The following quality indicators have been approved by the QM committee as the Quality Indicators from February 1, 2024, through January 31, 2025, and may be extended into the next calendar year if not revised by the QM committee and Medical Director.

The majority of indicators for the AP QI plan relate to the CAP Laboratory General and Section-Specific Checklists, or are derived from best-practice indicators for clinical laboratories:

- |                |   |
|----------------|---|
| Analytic:      | 1. Comprehensive Cytology (Medical and GYN Cytology TAT)                        |
| Analytic:      | 2. Small Biopsy TAT   |
| Analytic:      | 3. Complex Cases TAT  |
| Analytic:      | 4. Intraoperative (Frozen Section) TAT  |
| Analytic:      | 5. Autopsy PAD (Provisional Autopsy Diagnosis)                                  |
| Analytic:      | 6. Autopsy TAT (Final Autopsy Report)   |
| Post-Analytic: | 7. Intraoperative Correlation (Frozen Sections)                                 |
| Post-Analytic: | 8. Revised (Corrected) Reports  |
| Pre-Analytic:  | 9. Patient Identification Error, Unlabeled Cases or Missing Patient Information |
| Pre-Analytic:  | 10. COMPASS – Molecular Specimen Adequacy                                       |
| Analytic:      | 11. COMPASS – Single Test Turnaround Time                                       |
| Analytic:      | 12. COMPASS – NGS Test Turnaround Time  |
| Pre-Analytic:  | 13. COMPASS – FISH Specimen Adequacy  |
| Analytic:      | 14. COMPASS – FISH Test Turnaround Time (TAT)                                   |
| Analytic:      | 15. COMPASS – Methylation Turnaround Time                                       |
| Pre-Analytic:  | 16. Flow Cytometry Bone Marrow Aspirate (BMA) Specimen Adequacy                 |
| Pre-Analytic:  | 17. Immunohistochemistry (IHC) Pre-Analytic Errors                              |
| Analytic:      | 18. IHC Analytic Errors (Requests for Repeat Stains, QA issues)                 |
| Analytic:      | 19. Submitted Service (SS) TAT  |
| Post-Analytic: | 20. Medicolegal & Return Material TAT   |

## **1. Medical and GYN Cytology Comprehensive Turnaround Time**

The quality of services provided by a laboratory may be measured by the TAT of tests done by the lab. A recent study collected data on TAT for medical (non-gynecological) cytology from 180 laboratories. Results showed that labs in the top 50 % of participants would have 90% of medical cytology cases with TAT (receipt to report) of 3 calendar days. It was not mentioned what types of laboratories participated in the study; however, it is likely that a large portion of participants were nonacademic labs. LP provides anatomic pathology services for the Clinical Center as well as 21 different Institutes of the National Institutes of Health (NIH). NIH is a large clinical/research institution where all patients participate in protocol studies for various diseases and disorders including rare syndromes and cancers. Only a minority of patients require a primary diagnosis. A significant number of medical cytology cases require additional ancillary studies and/or further workup to confirm primary diagnosis, exclude secondary malignancy/disorder or include additional studies mandated by protocol. Therefore, the process involved in signing out medical cytology cases at the NIH is more complex and does not reflect the medical cytology cases seen at more “conventional” cytology labs where primary diagnosis is often the main concern. In addition, the NIH LP is a teaching department with accredited residency and fellowship programs in anatomic pathology. These facts must be taken into consideration when defining a threshold for medical cytology TAT. As reported by ADASP for TAT in surgical pathology cases, extra time should be allowed for cases requiring recuts, immunohistochemistry, etc. The same principle is valid for medical cytology cases. The threshold established for medical cytology TAT was based on the above information and in accordance with expectations of SAC. A prospective study on the TAT for gynecologic cytology specimens including 371 laboratories showed that half of the participating labs were able to sign out 90% of the cases within 8 calendar days. Typically, these labs have a large volume of gynecologic cytology specimens. The number of gynecologic cytology cases seen at LP is low. Based on this observation and in accordance with SAC expectations, the TAT for gynecologic cytology established by the committee is within the expected TAT for our patient population. The volume of GYN cases is limited; therefore, a more relevant quality monitor is the comprehensive turnaround times for Medical and GYN cases for the month.

Threshold: 90% of medical and gynecologic cytology cases signed out within 5 working days.

## **2. Small Biopsy Turnaround Time**

The quality of services provided by a laboratory may be measured by the TAT of tests done by the lab. CAP CMS Measure QCDR ID:CAP22 recommends that final pathology reports for biopsies meet a 2-day turnaround time. For performance year 2021, 27 reporting entities submitted data on this measure to CMS, ranging from 243 cases to 77,940 cases. Performance scores range from 68.5% to 100% with an average performance of 91.27%. However, the LP provides anatomic pathology services for the Clinical Center as well as 21 different Institutes of the National Institutes of Health (NIH). NIH is a large clinical/research institution where all patients participate in protocol studies for various diseases and disorders including rare syndromes and cancers. Only a minority of patients require a primary diagnosis. A significant number of biopsy cases require additional ancillary studies and/or further workup to confirm primary diagnosis, exclude secondary malignancy/disorder or include additional studies mandated by protocol. Therefore, the process involved in signing out biopsy cases at the NIH is more complex and does not reflect the biopsy cases seen at more “conventional” surgical pathology labs where primary diagnosis is often the main concern. In addition, the NIH LP is a teaching department with accredited residency and fellowship programs in anatomic pathology. These facts must be taken into consideration when defining a threshold for small biopsy TAT. As reported by ADASP for TAT in surgical pathology cases, extra time should be allowed for cases that needed recuts, immunohistochemistry, etc. Therefore, the threshold established for small biopsy TAT was based on the above information and in accordance with expectations of SAC. Turnaround times demonstrated consistent compliance with the established threshold over CY2022, the Medical Director requested an evaluation of the potential to decrease the TAT threshold to 5 days from 7 days. CY 2023 was able to report more than half the year was able to reach

the 5-day TAT. We will continue tracking the 5-day TAT and remove the 7-day TAT trend line from our graphs.

Threshold: 90% of small biopsy cases signed out within 5 working days.

### **3. Complex Cases Turnaround Time**

The quality of services provided by a laboratory may be measured by the TAT of tests done by the lab. A study collected data on TAT for complex surgical pathology cases from 489 laboratories in the U.S. and abroad. Results showed that 60 % of complex special-handling cases were signed out within 2 working days. The median TAT was 2.6 days with a range of 0-13.5 days. LP provides anatomic pathology services for the Clinical Center as well as 21 different Institutes of the National Institutes of Health (NIH). NIH is a large clinical/research institution where all patients participate in protocol studies for various diseases and disorders including rare syndromes and cancers. Therefore, the LP surgical pathology complex cases are considered special handling complex cases. In addition, a significant number of complex cases require additional ancillary studies and/or further workup to confirm primary diagnosis, exclude secondary malignancy/disorder or include additional studies mandated by protocol. The NIH LP is also a teaching department with accredited residency and fellowship programs in anatomic pathology. These facts must be taken into consideration when defining a threshold for complex cases TAT. As reported by ADASP for TAT in surgical pathology cases, extra time should be allowed for cases requiring overnight fixation, resubmission, recuts, immunohistochemistry, etc. The threshold established for complex surgical pathology cases was based on the above information and in accordance with expectations of SAC. TAT was consistently met at 10 working days; Medical Director requested a decrease in TAT which was moved from 10 working days to 8 working days in July of 2022. We will not be showing the 10-day trend line anymore since we have been meeting the 8-day threshold more consistently.

Threshold: 90% of complex cases signed out within 8 working days.

### **4. Intraoperative (Frozen Section) Turnaround Time**

Frozen Section (IOC) is an essential tool for patients undergoing surgery to aid the surgeon with a rapid diagnosis; therefore, IOC turnaround time (TAT) might have direct impact on patient's therapy and safety during and after surgery. This indicator results from a CAP Q-Probe study of 32,868 frozen sections in 700 hospitals (Archives of Pathology Lab Medicine, 1997; 121:559-567) which suggests that 90% of frozen sections should be completed within 20 minutes. Twenty minutes is intended to apply to the typical single frozen section, and cases involving multiple sections on a single specimen or case (e.g., resection margins) should expect longer TATs. The threshold is established in accordance with the industry best practices and all outliers will be evaluated by the QM committee and recurring reasons will be addressed with the residents and faculty.

Threshold: 90% of frozen sections will be completed within 20 minutes average

### **5. Provisional Autopsy Diagnosis (PAD)**

The CAP establishes a standard for completing Preliminary Autopsy Diagnosis (PAD). The standard requires that a documented preliminary report of the gross pathologic diagnosis is submitted to the institutional record in 90% of the cases within two working days. The CAP ANP.33100 requires that a written preliminary report of the gross pathologic diagnoses be submitted to the attending physician and the institutional record in 90% of the cases within a reasonable time. As a result, the QM committee will monitor the number of cases that fall outside this standard, investigate the cause, and make recommendations for process improvement. At the NIH, one patient can be assigned two autopsy case numbers, one for the brain (AN-prefix) and the other for the body

(AU-prefix). PADs are reported per patient, not per autopsy case number, so AN-cases with corresponding AU-cases are not included in the PAD standard. PADs are not entered for submitted cases. Submitted cases include those received as bodies or slides/blocks from outside institutions.

Threshold: 90% of autopsies that have PAD will have that PAD entered into the LIS within three working days of the autopsy.

## **6. Final Autopsy Turnaround Time**

Autopsy reporting is an important part of the quality management of medical care. It may be the only tool for answering questions and is the gold standard for determining the cause of death. Autopsies serve to identify diseases that were unknown at the time of death. The NIH Clinical Center Medical Records Department, in line with JCAHO standards, has set a goal for all final autopsy reports to be returned within 60 calendar days of the autopsy. The CAP's standard is set at 60 working days for 90% of cases and requires ongoing review of cases failing to meet this deadline. Accordingly, the QM committee will review the TAT on all final autopsy reports and assess possible resolutions to prevent similar future outliers.

Threshold: All autopsy Final Autopsy Diagnosis (FAD) must be signed out within 45 calendar days of the performance date of the autopsy. Outliers must have documentation to identify the reason for the delay if they surpass 60 calendar days, and an evaluation by the chief medical officer to determine future corrective actions to prevent similar delays.

Threshold: 100% within 45 working days

## **7. Intraoperative Correlation (Frozen Sections)**

Discrepancies between frozen section and final diagnosis that significantly impact on patient's treatment and/or management (major discrepancies) will be tracked and reported to the committee. The QM committee will address major discrepancies and compliance with IOC review during each QM meeting. Through CAP's Q-Probe program, which surveyed 90538 ICs performed in 461 institutions and found a case disagreement rate of 2% when uncorrected for deferred cases. A recent study of IOC and final diagnosis looked at 2812 specimens, which had a 96.75% agreement. Findings from the CAP's W-Tracks and Q-Probes show those who monitor this as a quality indicator have IC/FD disagreement rates close to 2% with improved performance over time.

Threshold: ≤2% of major discrepancies

## **8. Revised (Corrected) Reports**

The number of reports revised for reasons that significantly impact on patient care (major reasons) will be tracked for AP as well as for all other LP sections/units/labs and reported to the committee. In accordance with the CAP's 2008 National Laboratory Safety Goals, all inaccuracies will be documented and communicated as soon as an inaccuracy becomes known. Significant impact to patient care will be assessed by a pathologist, and in accordance with the CAP Safety Goals, the pathologist should discuss the matter with the physician who ordered the consultation to determine how best to communicate the result to the patient. Compliance of this quality indicator will be assessed by reviewing all corrected reports and documentation.

Threshold: No corrected or revised report that impacted or potentially impacted patient care -and – 100% compliance with documented physician notification



### **9. Patient Identification Errors, Unlabeled Cases or Missing Patient Information**

Another relevant CAP National Laboratory Safety Goal is to improve patient and sample identification at specimen collection, analysis, and reporting. LP staff documents identification errors with mislabeled specimens, slides, unlabeled cases, or reports and records with missing or inaccurate patient information. For 2010 quality indicators, SB (small biopsy) and SI (complex cases) surgical pathology specimens will be tracked, and system improvements addressed by QM Committee in partnership with section chiefs. A CAP study focused on 136 laboratories, with 427,255 reviewed cases where 0.4% (1811 cases) had some sort of mislabeling. The overall mislabeling rates per 1000 were 1.1 cases, 1.0 specimen, 1.7 blocks, and 1.1 slides. .00

Threshold:  $\leq 5\%$  of total SB/SI cases.

### **10. COMPASS - Molecular Diagnostics Specimen Adequacy**

The quality of services provided by the laboratory is related to the condition of the sample received and the receipt of correct documentation. The Clinical Molecular Testing Core assesses the adequacy and documentation of all specimens received. Blood and bone marrow samples must be received with adequate anticoagulation and should not be clotted. All blood and bone marrow specimens must have at least 1 ml of sample. Unstained slides and paraffin blocks must contain sufficient tissue for analysis. The sample must be labeled with the patient's name or other clear identifier and must be accompanied by a CRIS or Softpath order specifying the specific test.

Threshold: 0 specimen submission and processing errors

### **11. COMPASS – Single Test Turnaround Time**

The quality of services provided by a laboratory may be measured by the TAT of tests done by the lab. The Clinical Molecular Testing Core continues to strive to improve and maintain satisfactory report time from specimen receipt through final report. There are currently no industry standards or norms for the turnaround time of Molecular tests. Based on our patient population (research based) and expectations of our medical staff, ten working days is established as the threshold for single test cases.

Threshold: 90% of cases reported within 10 working days of receipt.

### **12. COMPASS – NGS Test Turnaround Time**

The quality of services provided by a laboratory may be measured by the TAT of tests done by the lab. The Clinical Next Generation Sequencing Unit continues to strive to improve and maintain satisfactory report time from specimen receipt through final report. There are currently no industry standards or norms for the turnaround time of Molecular tests. Based on our patient population (research-based) and expectations of our medical staff, ten working days is established as the threshold for NGS cases.

Threshold: 80% of cases reported within 20 working days of receipt.

### **13. COMPASS - FISH Unit Specimen Adequacy**

The quality of services provided by the laboratory is related to the condition of the sample received and the receipt of correct documentation. The Clinical FISH Unit assesses the adequacy and documentation of all

samples received. In most cases, one H&E stained and four unstained slides per patient/sample are required. H&E stained should be reviewed by a pathologist who may designate tumor area(s) for analysis. Unstained slides must contain sufficient tissue for analysis. The sample must be labeled with the patient's name or other clear identifier, and all cases must be accompanied by a CRIS or Softpath order specifying the specific test.

Threshold: 0 specimen submission and processing errors

#### **14. COMPASS- FISH Unit Turnaround Time (TAT)**

The quality of services provided by a laboratory may be measured by the TAT of tests done by the lab. The Clinical FISH Unit continues to make every effort to improve and maintain satisfactory report time from specimen receipt through the final report. The current industry standard for the turnaround time of FISH tests for formalin fixed paraffin-embedded (FFPE) tissues is 7 days [8]. Based on this observation, the TAT for the FFPE FISH established by the QM committee is within the expected TAT for our patient population.

Threshold: 90% of cases reported within 7 working days of receipt

#### **15. COMPASS - Methylation Arrays Turnaround Time (Analytic)**

Methylation array analysis is a genome-wide DNA methylation profiling test used as a diagnostic for tumors of the central nervous system. The validated tool is based, in part, on data published in a recent Nature study that showed tumor methylation profiles can provide definitive evidence to complement and refine morphology-based diagnostics in tumors of the brain and spinal cord. In the study, methylation data resulted in a change in diagnosis for 129 cases (12%) of the cohort. The NCI Laboratory of Pathology is poised to become a diagnostic reference center to implement this tool for diagnostically challenging neuropathology cases. Going forward, it is likely that new methylation-based classifiers will emerge for additional tumor types, and we are poised to lead in this area. As LP's Clinical Methylation Unit is one of only two laboratories in the nation performing this clinically validated methylation profile test, the threshold is developed based on time to process, analysis and pathologist interpretation. Initial turnaround time for the first months of testing averaged 13 days from order to reporting. As this method becomes more available in other healthcare facilities, LP's thresholds will be assessed comparatively to industry norms. Until that time, LP's methylation turnaround time will be continually monitored to determine if there are any areas to improve the threshold.

Threshold:  $\geq 90\%$  within 21 days

#### **16. Flow Cytometry Bone Marrow Aspirate (BMA) Specimen Adequacy**

Optimal specimen quality is vital for successful flow cytometric immunophenotyping. Clotted specimens may result in loss of the cells of interest and may compromise test result accuracy. The technologist performs gross inspection on all specimens to detect non-optimal specimen conditions. Clots in all specimens are noted in the LIS Specimen Source Modifier field upon specimen receipt and when discovered during processing. The QM committee will monitor the number of clotted specimens received by Flow Cytometry.

Threshold:  $\leq 5\%$  of BMA specimens received with clots

### **17. Immunohistochemistry Pre-Analytic Errors (e.g. Patient Identification, Processing issues)**

A 1994 Q-Probes study involving over one million cases from 417 institutions documented identification and accessioning deficiencies in 6% of total cases accessioned, with a median deficiency rate of 3.4%. Errors related to specimen identification accounted for 9.6% of these deficiencies, discrepant or missing information were present in 77%, and 3.6% involved specimen handling<sup>6</sup>. This quality indicator was established in CY2015, and the initial threshold established for allowable errors for pre-analytic variables (e.g., patient identification, processing, and handling events) measured against total IHC cases stained for the month was consistently less than 0.5 percent. CAP checklists (GEN.40490, ANP. 11950) establish standards for Patient Identification.

Threshold:  $\leq 0.5\%$  of all IHC stains ordered per month will have no pre-analytic errors.

### **18. Immunohistochemistry Analytic Errors (e.g. Requests for Repeat IHC Stains, QC issues)**

An inadequate immunohistochemical stain may be the result of less than optimal tissue fixation, selection and/or processing, antibody failure, or technical factors. It is important that the lab document all requests for repeat stains, the reason for the request, the corrective action performed, and final outcome<sup>6</sup>. Whether an IHC request for repeat is due to technical, clerical, or procedural error, the reasons to repeat stain requests should be reviewed for trends to determine if there are systematic errors for which changes should/could be implemented to prevent recurring quality failures that result in repeat stains. The IHC laboratory has developed a tracking sheet to document CAP checklist (ANP.21395) Special Stains/Studies, all immunohistochemical stains should be of adequate quality and controls are demonstrated to work as expected on each day of use for the tissue components or organisms for which they were designed. Some examples of common problems include: high background, periphery staining, no or weak staining, and tissue detachment. All analytic errors and repeat requests will be reported and assessed.

Threshold:  $\leq 0.5\%$  of repeated IHC stains

### **19. Submitted Surgical Pathology Cases (SS) Turnaround Time (Analytic)**

An integral component of the LP clinical service is review of submitted surgical materials for patients being considered for an NIH research protocol. Additionally, LP pathologists are considered experts in certain disciplines, and their consultative services are requested by non-NIH institutions for the rendering of a second opinion. Variables to consider while assessing issues with the submitted service turnaround times include: (1) identifying the purpose for the Consult (e.g. some second opinion rather than protocol-driven); (2) the type of Consult; is the patient being considered for protocol or is it a personal consultation or second opinion for a specific pathologist; (3) were there additional documents requested from submitting facility (NIH staff or submitted outside source) that are not within the scope of control of LP staff; or (4) consideration if the submitted case for patient protocol review was received without accompanying paperwork from the submitting clinic. This indicator is implemented to determine if there are systematic errors or specific variables that contribute to extended turnaround times, which might be addressed.

Threshold determination: According to Volmar, K., et. al., (2015), median turnaround times in government institutions was 6.06 days for complex surgical specimens (based on a 2012 CAP Q-Probes Study of 56 Institutions reported on 2,763 large or complex cases). It is important to consider whether there are potential processing issues, such as requesting additional material or missing paperwork, and whether this includes routine consults that are less time-critical that are mixed with consults for protocol consideration. Initially, a threshold of 90% within 10-days was evaluated, similar to the turnaround time indicator for complex surgical cases; however, initial data demonstrates that 90% within 7 days is a more effective threshold. This and all

thresholds are reviewed periodically by the QM Committee and the Medical Director and can be revised to strive for further improvement, Medical Director requested a decrease in TAT from 7 working days to 5 days.

Threshold:  $\geq 90\%$  within 5 days

## **20. Medicolegal and Return Material Turnaround Time (Post-Analytic)**

LP's Surgical Pathology service routinely receives requests to have non-NIH submitted patient material (stained, unstained slides recut or whole blocks [less frequently]) returned to the submitting facility or forwarded to another facility at a patient's request if that patient is being treated or being considered for another protocol in that facility. It is an important responsibility that LP staff efficiently process patient requests to forward pathology material to other facilities. Additionally, patients who are on multiple protocols in various health care organizations routinely ask that their material be returned to the submitting facility so that they can send on to other facilities. Historic customer satisfaction surveys provided feedback that having material sent to other facilities may take too long, so this indicator was created to monitor the turnaround times for return material requests.

Threshold determination: Numerous factors can contribute to the time it takes from receipt of a request for material until the time it is mailed to the requesting facility. These factors include whether formal requisition is needed, determination if and/or how much material can be released to that facility, availability of the material (time to recut if necessary), release by the attending pathologist, and administrative staff availability to process the paperwork and physically mail the material. For the purpose of evaluating an initial threshold, we referenced Giannini et al. (2011), of the Mayo Dept of Lab Medicine and Pathology, which established expected return of their submitted material at 14 days for clinical cases and 6 months for materials requested for research or education. With a focus on the clinical expectation and based on LP's initial QM data which suggests that 7 to 10 days from receipt of request would be a more appropriate target, the Medical Director has requested setting the threshold at the lower limit and eventually striving to improve even that threshold.

Threshold:  $\geq 90\%$  within 7 days

**ANNUAL QUALITY MANAGEMENT PROJECTS –  
REGULATORY COMPLIANCE (RC)**

**RC-I. Biennial Customer Satisfaction Survey – GEN.20335 (due late 2025)**

The Laboratory of Pathology measures the satisfaction of healthcare providers with laboratory services every two years. Satisfaction metrics are important for understanding the needs of clients (physicians, patients, referring laboratories, nurses, etc.) to improve laboratory services. Experience has shown that surveys are more informative if they are conducted anonymously and allow for open-ended comments. The sample size should be adequate. A numeric satisfaction scale allows for calculation of statistics.

**RC-II. Quality of Water – GEN.41500 (due Annually)**

The quality (specifications) of the Laboratory's water, whether prepared in-house or purchased, must be checked and recorded at least annually; however, the LP tests water microbial check more frequently. The frequency and extent of checking may vary, according to the quality of source water and specific laboratory needs. Corrective action must be recorded if water does not meet acceptability criteria. LP conducts biannual PMs and tests for maximum microbial content (CFU/mL) <10.

**RC-III. Biennial Report Format and Content Review (due 4<sup>th</sup> quarter 2025)**

The laboratory director (or a designee who meets CAP qualifications for laboratory director) must review and, at least every two years, approve the content and format of laboratory patient reports (whether paper or computer screen images) to ensure that they effectively communicate patient test results, and that they meet the needs of the medical staff (GEN.41067).

**RC – VI: Patient Confidentiality QA (due February September 2024)**

In order to satisfy the College of American Pathologists' (CAP) standard GEN.41303, Patient Confidentiality QA, the Laboratory of Pathology will conduct an annual audit of compliance with the NIH and LP patient confidentiality policies. LP policies dictate that: 1) requests for release of patient reports must initiate from the NIH Clinical Center's Medical Records department, or based on the distribution list provided by the submitting clinician for consultative and submitted cases; and 2) any report released electronically will be encrypted when released to internal NIH health care providers, and/or password protected file(s) when submitting reports to the patients' non-NIH health care provider(s).

In order to satisfy the annual audit, LP staff will:

Review no less than 5 random Medico-legal requests from the previous calendar year to ensure that there is proper patient authorization to release the patients' report to the requested provider or facility. The quality reviewer will ensure: a) The Medicolegal request includes the patient signed authorization; b) The pathology report was submitted to the intended audience (e.g. patient's own request, submitting health care provider, and/or facility); c) The transmission of the pathology report was securely encrypted and/or used a password

protected file if transmitted electronically; and d) If possible, contact the facility to ensure the report was received securely.

Review no less than 5 random submitted surgical (SS) cases with distribution that included at least 1 internal NIH provider and at least 2 external facilities. The quality reviewer will: a) Ensure the name(s) and address(es) of the distribution list are correct by reviewing the original submitted case documents; b) Ensure the internal NIH email was encrypted (the reviewer can print the sender's sent email file as evidence); and c) Ensure the distribution to the external health care provider or facility was encrypted and/or password protected and password did not accompany the same email as the report. This review can also be done via reviewing the Surgical Pathology Patient Care Coordinator's sent emails. All evidence (emails and reports) will be submitted to the Clinical Manager, and the results of the audit will be submitted to the Quality Management Committee and Medical Director with appropriate investigations and corrective actions if necessary.

## **RESIDENT & CLINICAL FELLOW PROJECTS (CFP)**

The LP QM program will also incorporate "projects" that will address specific CAP checklist requirements and areas that need further monitoring and improvement based on the results of indicators monitored in CY2023 and based on recurring issues in LP's sections that may pose a risk to quality management.

### **Guidelines for Residents/Fellows QM Projects**

- Identify an issue or area of LP's clinical services that require process improvement
- Suggestions might include examples such as:
  - Pre-analytic Variables – specimen collection, requisitions, transport, receiving
  - Analytic Variable – turnaround times, grossing, procedures, stains, interpretations, reporting
  - Post-Analytic Variables – supplementals, customer complaints, corrected reports, physician notification of abnormal reports
- Discuss the issue(s) with the sections' technical staff or director
- Develop a plan: Identify metrics, data sources, how to report, how to address system issues
- Coordinate with a mentor – e.g. Lead Technologists, Medical Officers, Clinical Manager
- Implement the Plan(s), Monitor Metrics, Quarterly Reports to LP QM Committee
- The most important consideration when developing your Project Plan: there MUST be an end to the project – there must be a SOLUTION

## **RESIDENT & CLINICAL FELLOW PROJECTS**

### **CAP Cancer Protocol Reporting**

*Christopher Dampier and Dilara Akbulut (Dr. David Kleiner attending faculty)*

CAP cancer reporting protocols should be incorporated in the final surgical pathology report for those cases for which such protocols exist and are made available by CAP. Anatomic Pathology CAP Checklist# ANP.12350. Consistency in reporting was less than 80% for mandated reporting when this project started. The LP Residents focused on having 100% compliance with the reporting of the CAP cancer protocols for those tumors for which such protocol exists by providing all Residents and Attendings CAP cancer protocols table listing all tumor types that require reporting. SoftPath was also utilized by alerting Residents and Attendings about including a CAP cancer protocol by including it in the SI cases template header.

### **SS Case Patient ID/Accession Errors**

*Evsen Apaydin Arikan (Dr. Chinquee faculty advisor)*

Over the past three years, Residents raised a concern that there was an increase in clerical entry errors by the Accession staff for submitted and consult cases. The Resident project is to collect data (clerical errors by type, stratify significance of errors, and identify system solutions).

### **Reporting and Follow-up of Predictive Markers**

*Maria Rodriguez Pena and Mayank Patel (Dr. Filie attending faculty)*

Regulatory compliance requires that the reporting of the predictive marker Her2 should be done either by using the manufacture's instructions or the ASCO/CAP scoring criteria. Similarly, the reporting of the predictive markers estrogen and progesterone receptors should be done by using the ASCO/CAP scoring criteria. In addition, as per LP policy, all Her2 cases reported as "Score 2+" should also have FISH studies for HER2 performed. This project will start by retrospectively looking if pathology reports are in compliance with these requirements in order to determine if there is/are any issue(s) that require corrective action(s).

### **Missing Slides**

*Martin Burks and Khaled Bin Satter (Dr. Newford faculty advisor)*

Residents and staff routinely seek slides/blocks for additional testing or requests for recuts for TRCs or return/medicolegal requests that are unable to be located. Dr. Nasir worked with Dr. Chinquee to identify tools for data collection, developed metrics and will monitor data for 2021. Data will drive potential corrective actions and system solutions.

### **Clinical Notification**

*Niharika Shah and Wanrun Lin (Dr. Chinquee faculty advisor)*

Regulatory compliance requires notification of treating clinician and staff of any unusual findings and revised or corrected reports. This project will focus on the notification (name and date) and 'read-back' that must be documented in the LP report. The Resident and Faculty advisor will be documenting the notification and read-back for both critical/unexpected and revised (potential patient impact on minor) categories.

### **Compliance with IHC Daily Control QC**

*Hot seat resident (All Residents; Dr. Filie attending faculty)*

IHC control slides review and QC must be completed daily, and slides and paperwork returned to the Immunohistochemistry lab daily. There are days that IHC controls are not documented. The objective is to have 100% compliance with the Control Slide Review item. For the beginning months of 2017, IHC control review was consistently deficient.

### **Resources**

1. College of American Pathologists (CAP) Accreditation Checklists: Laboratory General (GEN); All Common (COM); and Anatomic Pathology (ANP) Checklists, 10/24/2022 version.
2. Jones BA, Novis DA. Nongynecologic cytology turnaround time: a College of American Pathologists Q-Probes study of 180 laboratories. *Arch Pathol Lab Med* 2001;125:1279-84.
3. College of American Pathologists. Monitoring Diagnostic Rates, Turn Around Time, Concurrence of Diagnostics, (2011, May). Retrieved [http://webapps.cap.org/apps/docs/committees/cytopathology/topic\\_comm1.pdf](http://webapps.cap.org/apps/docs/committees/cytopathology/topic_comm1.pdf)
4. Alshieban, Saeed, and Khaled Al-Surimi. "Reducing turnaround time of surgical pathology reports in pathology and laboratory medicine departments." *BMJ quality improvement reports* vol. 4,1 u209223.w3773. 24 Nov. 2015, doi:10.1136/bmjquality.u209223.w3773

5. CMS Measure ID/CMS QCDR ID: CAP 2022. Available: [https://documents.cap.org/documents/CAP22\\_Turnaround-Time-Biopsies.pdf](https://documents.cap.org/documents/CAP22_Turnaround-Time-Biopsies.pdf)
6. Association of Directors of Anatomic and Surgical Pathology. Recommendations on Quality Control and Quality Assurance in Anatomic Pathology. *Am J Surg Pathol* 1991;15:1007-9.
7. Giannini, C., et al., (2011, March). Maintaining Clinical Tissue Archives and Supporting Human Research: Challenges and Solutions. *Arch Pathol Lab Med*; 135, 347-353.
8. Santana, M.F. & Ferreira, L.C., (2018). Errors in Surgical Pathology Laboratory. *Quality Control in Laboratory*. Doi: 10.5772/intechopen.72919
9. Novis DA, Zarbo RJ, Saladino AJ. Interinstitutional comparison of surgical biopsy diagnosis turnaround time: a College of American Pathologists Q-Probes study of 5384 surgical biopsies in 157 small hospitals. *Arch Pathol Lab Med* 1998;122:951-6.
10. Nakhleh, R.E., Fitzgibbons, P.L: Quality Management in Anatomic Pathology, Promoting Patient Safety Through Systems Improvement and Error Reduction. College of American Pathologists (CAP); 2005.
11. Nakleh, R.E., Idowu, M.O, Souers, R.J., Meier, F.A., & Bekeris, L.G. (2011, Aug). Mislabeling of Cases, Specimens, Blocks, and Slides: A College of American Pathologists Study of 136 Institutions. *Arch Pathol Lab Med* 2011; 135, 969-974
12. White, V.A., & Trotter, M.J. (2008). Intraoperative Consultation / Final Diagnosis Correlation: Relationship to Tissue Type and Pathologic Process. *Arch Pathol Lab Med*; 132, 29 – 39.
13. Wagar, E., Stankovic, A., Raab, S., Nakhleh, R., & Walsh, M. (2008, Oct). Specimen Labeling Errors: A Q-Probe Analysis of 147 Clinical Laboratories. *Arch Pathol Lab Med*; 132, 161 –1622.
14. Idowu, M., Bekeris, L., Raab, S., Ruby, S., Ruby, S., & Nakhleh, R. (2010). Adequacy of Surgical Pathology Reporting of Cancer: A College of American Pathologists Q-Probes of 86 Institutions. *Arch Pathol Lab Med*; 134, 969-947
15. American College of Medical Genetics. ACMG Technical Standards for Clinical Genetics Laboratories (2021 Revision) (2021).
16. Volmer, K., Idowu, M., Souers, R., Karcher, D., & Nakhleh, R. (2015). Turnaround Time for Large or Complex Specimens in Surgical Pathology: A CAP Q-Probes Study of 56 Institutions. *Arch Pathol Lab Med*; 139, No. 2, pp. 171-177.
17. Zembowicz, A., Ahmad, A., & Lyle, S. (2011) A Comprehensive Analysis of a Web-Based Dermatopathology Second Opinion Consultation Practice. *Arch Pathol Lab Med*: March 2011, Vol. 135, No. 3, pp. 379-383