COLLEGE OF PHYSICIANS AND SURGEONS PAKISTAN

FELLOWSHIP PROGRAMME

CHEMICAL PATHOLOGY

CHP

DURATION OF TRAINING 4 YEARS

2022

THIS IS AN EVOLVING DOCUMENT

The College of Physicians and Surgeons Pakistan would appreciate any criticism, suggestions, advice from the readers and users of this document. Comments may be sent in writing or by e-mail to the CPSP at:

DIRECTORATE OF NATIONAL RESIDENCY PROGRAM (DNRP)
College of Physicians and Surgeons Pakistan (CPSP)
7th Central Street, Defence Housing Authority, Karachi-75500.
nrp@cpsp.edu.pk

CONTENTS

ABOUT THE COLLEGE

The College was established in 1962 through an ordinance of the Federal Government. The objectives/functions of the College include promoting specialist practice of Medicine, Obstetrics & Gynaecology, Surgery and other specialties by securing improvement of teaching and training, arranging postgraduate medical, surgical and other specialists training, providing opportunities for research, holding and conducting examinations for awarding College diplomas and admission to the Fellowship of the College.

Since its inception, the College has taken great strides in improving postgraduate medical and dental education in Pakistan. Competency- based structured Residency Programs have now been developed, along with criteria for accreditation of training institutions, and for the appointment of supervisors and examiners. The format of examinations has evolved over the years to achieve greater objectivity and reliability in methods of assessment. The recognition of the standards of College qualifications nationally & internationally, particularly of its Fellowship, has enormously increased the number of residents and consequently the number of training institutions and the supervisors. The rapid increase in knowledge base of medical sciences & consequent emergence of new subspecialties have gradually increased the number of CPSP fellowship disciplines to eighty including specialties in dentistry.

After completing two years of core training during IMM, the residents are allowed to proceed to the advance phase of FCPS training in the specific specialty of choice for 2-3 years. However, it is mandatory to qualify IMM examination before taking the FCPS-II exit examination. The work performed by the resident is to be recorded in the e-logbook on daily basis. The purpose of the e-log is to ensure that the entries are made on a regular basis and to avoid belated and fabricated entries. It will hence promote accuracy, authenticity and vigilance on the part of residents and the supervisors.

The average number of residents taking CPSP examinations each year is to a minimum of 32,000. The College conducts examinations for FCPS-I (11 groups of disciplines), IMM, FCPS-II (80 disciplines), MCPS (22 disciplines), including MCPS in Health Professions Education and Health Care System Management. A large number of Fellows and senior medical teachers from within the country and overseas are involved at various levels of examinations of the College.

The College, in its endeavor to decrease inter-rater variability and increase fairness and transparency, is using TOACS (Task Oriented Assessment of Clinical Skills) in IMM and FCPS-II Clinical examinations. Inclusion of foreign examiners adds to the credibility of its qualifications at an international level.

It is important to note that in the overall scenario of health delivery over 85% of the total functioning and registered health care specialists of the country have been provided by the CPSP. To coordinate training and examination, and provide assistance to the residents stationed in cities other than Karachi, the College has established 14 Regional Centers (including five Provincial Headquarter Centers) in the country.

The five Provincial Headquarter Centers, in addition to organizing the capacity building workshops/short courses also have facilities of libraries, I.T, and evaluation of synopses and dissertations along with providing guidance to the residents in conducting their research work.

The training towards Fellowship can be undertaken in more than 308 accredited medical institutions throughout the country and 87 accredited institutions abroad. The total number of residents in these institutions is over 34,570 who are completing residency programs with around 5,399 supervisors. These continuous efforts of the College have even more importantly developed a credible system of postgraduate medical education for the country. The College strives to make its courses and training programs 'evidence' and 'needs based' so as to meet international standards as well as to cater to the specialist healthcare needs not only for this country but also for the entire region.

Prof. Mohammad Shoaib Shafi
President
College of Physicians and Surgeons Pakistan

FELLOWSHIP DISCIPLINES

The list of fellowship programmes, first and second fellowship, are given below:

DISCIPLINES FOR 1st FELLOWSHIP

1. Anatomy
2. Anesthesiology
3. Biochemistry
4. Cardiac Surgery
5. Cardiology
6. Cardio Thoracic Anaesthesia
7. Chemical pathology
8. Clinical Haematology
9. Community Medicine
10. Dermatology
11. Diagnostic Radiology
12. Emergency Medicine
13. Family Medicine
14. Forensic Medicine
15. Haematology
16. Histopathology
17. Immunology
18. Medicine
19. Medical Oncology
20. Microbiology
21. Nephrology
22. Neurology
23. Neurosurgery
24. Nuclear Medicine
25. Obstetrics and Gynaecology
26. Operative Dentistry & Endodontics
27. Ophthalmology
28. Oral & Maxillofacial Surgery
29. Orthodontics
30. Orthopaedic Surgery
31. Otorhinolaryngology (ENT)
32. Paediatric Surgery
33. Paediatrics
34. Periodontology
35. Pharmacology
36. Physical Medicine & Rehabilitation
37. Physiology
38. Plastic Surgery
39. Prosthodontics
40. Psychiatry
41. Pulmonology
42. Radiation Oncology
43. Surgery
44. Thoracic Surgery
45. Urology
46. Virology

DISCIPLINES FOR 2nd FELLOWSHIP

1. Breast Surgery
2. Child and Adolescent Psychiatry
3. Clinical Cardiac Electrophysiology
4. Community and Preventive Paediatrics
5. Critical Care Medicine
6. Developmental and Behavioural Paediatrics
7. Endocrinology
8. Gastroenterology
9. Gynecological Oncology
10. Hepato-Pancreato-Biliary & Liver Transplant Surgery
11. Infectious Diseases
12. Interventional Cardiology
13. Maternal and Fetal Medicine (MFM)
14. Neonatal Paediatrics
15. Orbit and Oculoplastics
16. Paediatric Cardiology
17. Paediatric Critical Care Medicine
18. Paediatric Endocrinology and Diabetes
19. Paediatric Dermatology
20. Paediatric Gastroenterology and Hepatology
21. Paediatric Haematology Oncology
22. Paediatrics Infectious Diseases
23. Paediatric Nephrology
24. Paediatric Neurology
25. Paediatric Ophthalmology & Strabismus
26. Pain Medicine
27. Palliative Medicine
28. Reproductive Endocrinology and Infertility
29. Rheumatology
30. Spine Surgery
31. Surgical Oncology
32. Urogynaecology
33. Vitreo Retinal Ophthalmology
34. Vascular Surgery

CPSP COMPETENCY MODEL

College of Physicians and Surgeons Pakistan has moved to competency-based medical education and has developed its own competency model shown below. A generic explanation of the model is given below and it is expected that all its residency training programmes follow the components of this model in accordance to the requirements of each specialty.

Patient or population care occupies the pivotal center. Patient care includes all clinical skills such as history taking, physical examination, requesting investigations, making diagnoses and managing the care. The inner leaves of the model represent the five major competencies directly related to patient care, while the three competencies in the outer circle are mega-competencies related to patient care and also incorporate education, professionalism, leadership, advocacy and population health.

By the end of the Residency Programme, residents are expected to acquire these competencies and their constituent learning outcomes, and provide promotive, preventive, curative and rehabilitative patient-centered (or population-centered) care.

Inner Leaves:

1. Knowledge and Critical Thinking
2. Technical Skills
3. Communication Skills
4. Teamwork
5. Research

Outer Leaves:

6. Professionalism
7. Pedagogy
8. Advocacy

1. Knowledge and Critical Thinking

- Demonstrate application of wide and current readings to critical thinking and problem solving
- Relate the alteration of body function to the presenting condition
- Interpret and integrate history and examination findings to arrive at an appropriate provisional and credible differential diagnoses
- Sequentially order, justify and interpret appropriate investigations
- Apply knowledge and reasoning skills to
    - Analyze data for problem identification and to rule in and rule out contending conditions
    - Synthesize and evaluate solutions for decision-making in solving familiar and less familiar problems based on best current evidence
    - Prioritize different problems within a time frame
    - Select, outline and provide, with evidence-based justifications, appropriate pharmacological and non-pharmacological management strategies
    - Assess new medical knowledge and apply it to resolve patient problems (Evidence-based practice)
    - Apply quality assurance procedures in daily work (Professionalism)
    - Demonstrate shared-decision-making with the patient or family
    - Provide cost-effective care while ordering investigations and in management
    - Use resources appropriately
    - Demonstrate awareness of bio-psycho-social factors in assessment and management of a patient.

2. Technical Skills

- Demonstrate International Patient Safety Goals (IPSG)
- Demonstrate competent performance of all required technical skills and procedures in the specialty, including:
  - Obtaining informed consent
  - Preoperative planning
  - Pre-interventional care and preparation
  - Intra-intervention technique including exposure and closure, global and task specific items, and communication and team skills
  - Post-interventional care
  - Follow-up Care.

3. Communication Skills

- Written Communication Skills
  - Maintain clear, concise, accurate and updated medical records
  - Write clear, focused, evidence-based and logical management plans and discharge summaries
  - Write respectful, clear and focused letters and referrals to other colleagues.
- Verbal Communication Skills: Demonstrate
  - Effective interpersonal communication skills: clear, considerate and sensitive towards patients, their relatives, other health professionals and the public, and towards students
  - Non-verbal communication skills:
  - Empathy and respect towards patients and their relatives
  - Effective counseling of the patient and the family with cultural sensitivity: explain options, educate them and promote joint decision-making.
  - Appropriate verbal and body language on the campus and all work situations including seminars, bedside sessions, outpatient sessions and others
  - Respect and tolerance for all health care professionals, including peers, juniors and seniors
  - Clear, focused and logical presentation of cases.

4. Teamwork

- Demonstrate constructive team-communication skills.
- Facilitate collaborative group interaction as a team member to build strong teams demonstrating respect, tolerance and interdependence.
- Support other team members to grow
- Demonstrate willingness to assume responsibility and leadership as needed.

5. Research

- Interpret and use results of various research studies (critical appraisal)
- Conduct a research study individually or in a group by using appropriate
  - Selection of research question(s) and objectives
  - Research design and statistical methods to answer the research question
- Ethical and R&RC approval of the synopsis or research articles
- Demonstrate competence in academic writing by writing an appropriate dissertation and/or publishing research article(s) as a step towards resolving issues or concerns in their specialty
- Guide others in conducting research by advising about research methodology including study designs and statistical methods
- Demonstrate clear, focused and logical presentations of their research.

6. Professionalism

- Demonstrate the highest level of personal integrity: honesty, punctuality, regularity, timely task completion
- Deal with all patients in a non-discriminatory, prejudice- free manner, demonstrating the same level of care for every human being irrespective of gender, age, ethnic background, culture, socioeconomic status and religion
- Establish a trusting relationship with patients, their relatives and care-givers

- Deal with all patients with honesty, empathy and compassion, putting patients' needs first (altruism)
- Facilitate transfer of information important for promotion of health, prevention and management of disease
- Encourage questioning by the patient and be receptive to feedback
- Pursue self-directed and life-long learning. Keep abreast of medical literature and assess new knowledge and apply it to resolve patient problems
- Know one's limitations and ask for help as needed from colleagues, consultations or referrals
- Apply quality assurance procedures for improvement in daily work
- Be a role model for others.

Ethics
- Maintain patient autonomy by demonstrating shared-decision-making with the patient and/or family
- Obtain informed consent, maintain patient confidentiality and **do no harm**
- Provide cost-effective care while requesting investigations and in management and use resources appropriately.

Leadership
- Demonstrate accountability for their decisions and actions, and that of their team
- Demonstrate willingness to assume leadership role(s) when needed in given situations or events (rush call/code).
- Change and bring about change as necessary, as a leader or supportive leader.

7. Pedagogy

Should be able to demonstrate competence in teaching skills:
- Effective clinical/community-based teaching
- Some evidence of acquisition of theory regarding learning and education
- Practice some of the best teaching methods.

8. Advocacy

Advocacy is needed at multiple levels

- Advocacy for the Patient
  - Doctors and nurses are the advocates of the patients, otherwise patients are likely to be lost in the system. All care should be timely, putting patients first.

- Advocacy for the Practice
  - Working in a service or practice, doctors must highlight limitations and issues
  - They must identify solutions for the problems, and recommend and implement improvements for the practice(s) and institutional system(s).

- Advocacy for the Health System and Society
  - Know one's role in the Health System(s) and build strong referral systems
  - Keep patient and community interests paramount, above one's own personal or professional interest
  - Demonstrate advocacy for elimination of the social determinants of health
  - Demonstrate advocacy for prevention of serious illnesses of their specialty/sub-specialty.

- For the Profession
  - Strive for building trust in the public for your profession
  - Demonstrate improvement and enhancement of profession, specialty and sub-specialty
  - Be conscientious gate-keepers of their profession, specialty and subspecialty.

Candidate will be admitted to the examination in the name (surname and other names) as given in the MBBS degree. CPSP will not entertain any application for change of name on the basis of marriage/divorce/deed.

ELIGIBILITY REQUIREMENTS FOR ENTERING INTO ADVANCE PHASE OF FELLOWSHIP PROGRAM IN CHEMICAL PATHOLOGY

- Passed FCPS-I in Pathology or granted exemption.
- Completed 2-year training for Intermediate Module in Pathology or granted exemption.

DURATION OF TRAINING

Total duration of the training is 4 years, which includes 2-year Intermediate Module (IMM) training in Pathology that consists of one year rotations in all disciplines of Pathology i.e. Chemical Pathology, Haematology, Histopathology, Microbiology, Immunology & Virology. The rest of the period is dedicated for basic principles and methodologies for preparing the resident for the advance phase (FCPS-II) learning in Chemical Pathology. Details of these rotations and IMM training can be found in CPSP document "Intermediate Module Pathology".

Candidates with M.Phil Pathology maybe granted exemption to pass FCPS Part-I (Pathology) and one year duration in the training of IMM Pathology. But, they will have to complete rotations in all branches of Pathology (as given in IMM Pathology Booklet) before appearing in IMM examination.

APPROVED TRAINING CENTERS

Training must be undertaken in units/departments/institutions approved by the College. A current list of approved locations is available from the College and its regional offices, as well as on the College website: www.cpsp.edu.pk

MANDATORY CLINICAL ROTATIONS

Vide CPSP Notification # CPSP/Sec/2022/338 dated 20th July 2022, following rotations in clinical disciplines are mandatory during the advance phase (FCPS-II) of Chemical Pathology training:

- General Medicine 3 Months
- Paediatrics 3 Months

REGISTRATION AND SUPERVISION

All training must be supervised and undertaken on whole time basis. The trainees are required to register with the R&RC and submit the name of their supervisor(s) by the date indicated on the registration form. The supervisor should be an FCPS Chemical Pathology or a with equivalent qualification duly approved by the college. Only that training will be accepted which is done under an approved supervisor of Chemical Pathology.

MANDATORY WORKSHOPS AND COURSE

All mandatory workshops should be attended during the first two years of training. Therefore no workshop is mandatory during the 3rd & 4th year of training. However the resident will be required to take any additional workshop as may be introduced by the CPSP.

RESEARCH

One of the training requirements is a dissertation or two research papers on topics related to the field of specialization.

- Synopsis of the dissertation must be submitted to Registration & Research Cell (R&RC) within six months of training in first year in Chemical Pathology training and should be approved before starting the research work.
- Topics/titles of the papers (two) should be submitted to Registration & Research Cell (R&RC) before submission of papers for publication
- Work on research leading to a dissertation or publication of two research papers
- The dissertation or evidence of publication /acceptance of research papers must be submitted six months prior to the examination for which the residents intend to sit in.

E-LOGBOOK

The CPSP council has made e-logbook system mandatory for residents of all residency programs inducted from July 2011. Upon registration with R&RC each resident is allotted a registration number and a password to log on to the e-logbook on the CPSP website. The resident is required to enter all work performed and the academic activities undertaken in the logbook on daily basis. The concerned supervisor is required to verify the entries made by the resident. Besides, the residents of Chemical Pathology during their clinical rotations (General Medicine & Paediatrics) are instructed to make their own notes separately for each case seen so that all aspects of the cases could be discussed with the parent supervisor later on. This system ensures timely entries by the resident and prompt verification by the supervisor. It also helps in monitoring the progress of residents and vigilance of supervisors.

AWARD OF FELLOWSHIP

Fellowship of the College of Physicians and Surgeons Pakistan is awarded to those applicants who have:

- a recognized medical degree;
- completed one year house job in a recognized institution
- passed the relevant FCPS Part I Examination;
- registered with the Registration & Research Cell (R&RC);
- undergone specified years of supervised accredited training on whole time basis.
- passed IMM examination in Chemical Pathology
- obtained approval of dissertation / two research articles (related to the specialty) published / accepted for publication in CPSP approved journal(s):
- completion of entries in e-logbook along with verification by the supervisor;
- declared successful in examinations carried out by the Examination Department of the CPSP; and
- elected by the College Council. It is important to note that all applicants must undergo a formal examination before being offered Fellowship of the relevant specialty, except in case of Fellowship without examination.

TRAINING ENQUIRES AND REGISTRATION

All residents should notify the College in writing of any change of address and proposed changes in training (such as change of supervisor, change of department, break in training etc.) as soon as possible.

Supervision of a resident is a multifaceted job. Arbitrarily the task is divided into the following components for the sake of convenience. This division is by no means exhaustive or rigid. It is merely meant to give semblance to this abstract and versatile role.

EXPERT TRAINER

- This is the most fundamental role of a supervisor. S/he has to not only ensure and monitor adequate training but also provide continuous helpful feedback (formative) regarding the progress of the training.
- This would entail observing the resident's performance and rapport with all the people within his/her work environment.
- S/he should teach the residents and help them overcome the hurdles during the learning process
- It is the job of the supervisor to make the residents develop the ability to interpret findings in their patients and act suitably in response.
- The supervisor must be adept at providing guidance in writing dissertation/research articles (which are essential components of training).
- Every supervisor is required to participate actively in Supervisors' workshops, conducted regularly by CPSP, and do his/her best to implement the newly acquired information/skills in the training. It is his/her basic duty to keep abreast of the innovations in the field of expertise and ensure that this information percolates to residents of all years under him/her.

RELIABLE LIAISON

- The supervisor must maintain regular contact with the College regarding training and various mandatory workshops and courses.
- It is expected that the supervisor will establish direct contact with relevant quarters of CPSP if any problem arises during the training process, including the suitability of resident.
- S/he must be able to coordinate with the administration of his/her institution/organization in order to ensure that his/her residents do not have administrative problems hampering their training.

PROFICIENT ADMINISTRATOR

- The supervisor must ensure that the residents regularly fill their e-logbook.
- S/he must provide quarterly feedback regarding each resident through e-log system.
- S/he might be required to submit confidential reports on resident's progress to the College.
- The supervisor should notify the College of any change in the proposed approved training program.
- In case the supervisor plans to be away for more than two months, he/she must arrange satisfactory alternate supervision during the period.

ROLES AND RESPONSIBILITIES
RESIDENT

Given the provision of adequate resources by the institution, residents should

- accept responsibility for their own learning and ensure that it is in accord with the requirements of the particular discipline
- play an informed role in the selection of the supervisor
- seek reasonable infrastructure support from their institution and supervisor, and use this support effectively
- ensure that all outlined aspects of training are covered during the defined training period
- work with their supervisors in writing the synopsis/ research proposal and submit the same by the end of first year of the registration with the R&RC
- accept responsibility for the dissertation and plan to execute the research within the time limits defined
- be responsible for arranging regular meetings with the supervisor to discuss and document progress. If the supervisor is not able/willing to meet with the resident on a regular basis, he/she must notify the College
- provide the supervisor with word processed updated synopsis and dissertation drafts (ensure it has been checked for spelling, grammar and typographical errors, prior to submission) and provide the raw data to the supervisor if required
- submit completed dissertation to R&RC or evidence of publication/acceptance for publication of two research papers in CPSP approved journal(s) or JCPSP six months before the completion of (last year of) training. The resident should be the first or second author of both papers and the titles of both papers must have a prior approval of R&RC
- follow the College complaint procedure if serious problem arises
- complete all requirements for sitting an examination

CURRICULUM: AIMS AND OBJECTIVES

The aim of the Fellowship Programme in Chemical Pathology is to produce specialists in the field who have attained the required competencies. By the end of the residency programme, the resident will be able to:

- Obtain appropriate history to comprehend the request for a pathological test
- Collect / receive patient specimens according to prescribed protocol
- Perform requested tests
- Interpret the results of tests and prepare reports to help clinicians make diagnoses
- Apply the requisite knowledge and skills to think critically and solve problems
- Be an effective team player, leading the team if necessary
- Communicate effectively with:
  - Patients and their attendants with empathy and compassion
  - Seniors, peers, juniors, learners and other health professionals
- Demonstrate risk analysis, quality assurance and delta check
- Ensure patient safety
- Manage emergencies related to the specialty
- Present well in multi-disciplinary team meetings, conferences, journal club meetings, CPCs, data interpretation sessions, quality control meetings and departmental meetings
- Keep up to date and practice evidence based medicine
- Demonstrate putting patients first
- Demonstrate honesty, integrity and timeliness (punctuality and task completion)
- Maintain confidentiality, patient autonomy, take appropriate consent and do no harm

- Ensure lab biorisk management and lab safety
- Consult with colleagues and refer as necessary
- Demonstrate effective teaching skills
- Exhibit advocacy for their patients, practice (service/ department), profession (discipline/specialty) and population-based problems related to their specialty
- Participate in clinical governance and clinical audit
- Demonstrate research, and use of research in improving clinical practice
- Maintain highest standards of practice
- Demonstrate conflict resolution, management skills and leadership

TECHNICAL COMPETENCIES

Specific Skills to Be Developed
Residents should be able to comprehend theoretical background of the analytical techniques, analytical methodology and various aspects of laboratory management. S/he should also learn specific skills given below:

Basic Laboratory Procedures
- Specimen collection including patient identification, consent taking, order of draw; handling and storage of specimen
- Methods of standardization and calibration
- Preparation and storage of reagents

Handling, Maintenance and Quality Control of Basic Lab Instruments
Residents should learn to handle equipment required for day-to-day lab work including their maintenance & quality control. This will help the residents prepare for the final exam carried out as TOACS. Some of these instruments are listed below:
- Pipettes
- Centrifuges
- Analytical balance
- PH meter
- ISE analyser
- Semi-automated
- Automated analysers
- Osmometer
- ELISA instrument
- Laboratory refrigerators

Analysis of Patients Specimens on a Photometer
Carrying out analysis of patients' specimen is one of the most important skills, a Chemical Pathologist should master. This will help them lead their lab staff in the future career (leading from the front). By continuous performance of these tests, residents will excel in the pipetting & analysis, and will not feel difficulty in carrying out these procedures during examination (Structured Assessment of Analytical Skills) in the stipulated time.

The tests should be done on a semi-automated photometric analyser and should include both end-point and kinetic tests. They must be well-versed with the principles, procedures, interferences and challenges faced in the analytical methods employed for these tests.

Laboratory Automation
Residents must learn the running and maintenance of stand-alone laboratory analysers. Where total laboratory automation (TLA) is available, they should also work closely with the lab staff & vendors technical team responsible for TLA.

Laboratory Calculations
Residents should develop the application of the correct formula for the calculation of derived tests and practice to perform these calculation swiftly without error. This will help the residents attempt the related TOACS stations in the final exam.

Urine Analysis
Urine analysis is part of TOACS of the final exam, so resident should learn to perform some basic tests on the urine e.g.:

- Glucose and other reducing substances
- Protein
- Bile salts and pigments
- Porphobilinogen
- Urobilinogen
- Ketone bodies

Point of Care Testing (POCT)
Residents should make themselves well-versed with various types and functioning of POCT. They should get themselves involved in training and problem solving of POCT devices during their clinical training, as these devices are likely to be part of some TOACS station in final exam.

QUALITY MANAGEMENT (QM)

Internal Quality Control (IQC)
Being one of the vital procedures of any diagnostic lab, resident must practice the IQC procedure on daily basis. IQC is an essential part of the Quality Management Module of the final

FCPS Practical Examination. Various aspects to be learn are:

- Handling of IQC Material
- Analysis of IQC in an appropriate frequency
- Basic statistics involved for IQC
- Levey-Jennings Plots
- Westgard rules

External Quality Assessment (EQA) or Proficiency Testing (PT)
Residents should learn the procurement, participation and interpretation of EQA Schemes. This will help the reisdents to appear in some of the TOACS stations in the final exam.

Method Validation
This part of QM requires highest level of technical skills and constitutes a major portion of the practical exam of QM in FCPS-II and some TOACS stations. Its components include:

- Precision
- Accuracy
- Analytical sensitivity
- Analytical specificity
- Analytical Measuring Range
- Limits of Detection
- Limits of Quantification
- Verification of Reference Values
- Robustness
- Criteria for acceptability
- Problem solving

Other Measures of QM
These measures include risk managent, delta check, six sigma and lean management.

Quick Interpretation of Data Interpretation Skills (QADIS)
This is one of the most important competencies required in a Chemical Pathologist to become an important member of the patient management team. This is an independent full module in final FCPS exam. In addition some TOACS stations may consist of in-depth analysis of laboratory data. Resident can master this skill by:

- Involving in regular discussions within the department

- Participation in discussion with clinicians in the clinical problem solving sessions
- Discuss the use of laboratory procedures and protocols with clinical colleagues
- During Mandatory Clinical Rotation they should attend ward rounds, out-patient clinics, CPC, on call work, etc.
- Participate, under appropriate supervision, in laboratory reporting rotas, follow-up of deranged findings and investigations, visit wards to correlate the lab findings
- Case presentations at appropriate forums
- Contribute in the clinical care of patients with metabolic and other relevant disorders.

Dynamic Function Tests

- All residents should be familiar with protocols for common dynamic function tests and other timed investigation procedures, and should gain experience in their interpretation.
- The residents must gain sufficient first-hand experience to enable them to take clinical responsibility for such procedures. This will help the residents in appearing in some TOACS stations of final examination.

Laboratory Management

Resident should fully involve himself/herself in various activities of laboratory management and gain expertise in it, to prepare not only for the final FCPS Exam but also for the future employment. Some of the lab management areas include:

Laboratory Information Management System (LIMS)

Resident should familiarize with various aspects of LIMS and other IT systems. They should frequently interact with IT staff and actively involve themselves in trouble shooting and security of data.

Establishing Reference Values

Residents should participate in the projects carried out for establishing reference values.

Water Purification Systems
Reagent grade water is vital for accurate laboratory tests. Residents must learn the skills required for the availability and monitoring of laboratory water.

Clinical Utility of Laboratory Tests
Various parameters of clinical utility of tests e.g. specificity, sensitivity, predictive values and likelihood ratios as well as statistical tools like ROC Curves etc. should be learnt by the residents during the training.

Laboratory Biorisk Management and Laboratory Safety
Residents should get expertise of various laboratory safety procedures e.g. use of personal protective equipment, prevention of chemical, electrical and fire hazards. He/she should prepare himself/herself as a leader of the team responsible for the safety of the laboratory staff and community.

Inventory Management and Procurement
Residents should involve in procurement of lab equipment and reagents as well as maintenance of the laboratory inventory. Should learn the procedures for prevention of pilferages.

Laboratory Accreditation
Residents should learn the preparations, proceedings and vigilance of laboratory accreditation.

Communication Skills:
Resident should develop soft skills required for dealing with the patients, laboratory staff, clinical colleagues and hospital administration e.g. breaking bad news, anger management, conflict resolution and task delegation.

Optional Skills

Skills mentioned below are optional because these are currently available only in some of the CPSP accredited institutes and are in the optional list of the accreditation requirement of CPSP:

- Traditional and Capillary Electrophoresis
- Chromatography
- Mass Spectrometry
- Drug analysis (e)
- Toxicological methods
- Atomic absorption spectroscopy / metal analyses
- Fluorometry
- Polymerase chain reaction (PCR) and other genetic techniques

Residents and their supervisors should carry out whole-hearted efforts to procure the necessary equipment for these skills in their departments. If, however, the equipment can not be procured, then collaboration should be done with other institutes for arranging training workshops or short courses to impart training to the residents on such equipment. This will help the residents in final theory and TOACS exams.

CLINICAL ROTATIONAL COMPETENCIES

By the end of the clinical rotations, the resident should be able to:

Patient Care

- Obtain & record a patient's history in a logical, organized, and thorough manner
- Perform and record a complete physical examination in a logical, organized, and thorough manner for new patients and an appropriately focused physical examination for follow up patients
- Obtain and understand important supplemental information, including diagnostic laboratory work up results, ECG and radiological investigations
- Formulate and document an assessment that includes the relevant differential diagnoses based on data gathered to guide initial diagnostic evaluation and disease management
- Present a new patient's history and physical examination clearly and with appropriate detail
- Present a follow-up on patient's case (including those with more than one problem) in a focused manner, including diagnostic and therapeutic plans
- Write cogent, clear progress notes documenting working diagnosis & status of diagnostic evaluation & therapeutic plans
- Conduct rounds of the special units (Critical Care Areas e.g. ICU and NICU) as a member of the management team with particular reference to providing help in the diagnosing/ management of:
    - Electrolyte Disturbances
    - Acid Base Disorders
    - Point of Care Testing
    - Issues related to Lab Specimen and Reporting

Medical Knowledge

Relate pathophysiology and clinical reasoning with clinical/ laboratory data to initiate evaluation and develop management plans for:

- Disorders of nutrition
- Cardiovascular risk assessment including dyslipidemias

- Metabolic bone diseases
- Diabetes mellitus
- Inherited metabolic disorders
- Thyroid disorders
- Other endocrine disorders
- Critical care
- Malabsorption
- Hepatitis and congenital bilirubinaemias
- Growth disorders

Professionalism

- Demonstrate effective communication strategies and professional behaviors with patients, families, and all members of the health care team (including physicians and non-physician health professionals)
- Treat all patients, staff, and colleagues with respect, which includes maintaining a professional demeanor in speech and dress
- Place the care of patients above competing interests
- Strive for excellence, honesty, integrity and altruism

Research and Development

- Undertake at least one research project during their training. The project should be consistent with the research / development programme of the laboratory or hospital and should be sufficiently novel and timely to be suitable for presentation at a scientific meeting and publication in a peer-reviewed journal
- Corelate clinical conditions with underlying chemical changes during clinical rotations, which would provide important areas for research & development as well as enhance independent and team-driven problem solving, critical assessment of published work and for gaining analytical expertise

Continuing Professional Development

Develop life-long habits of reading, using literature and other information database searches, consultation with colleagues, attendance at scientific meetings, and the presentation of scientific work as part of continuing education.

SYLLABUS

Theoretical Knowledge

The list of topics below is an indication of the areas of scientific training which the residents, with the help of their supervisors, must address in detail. It should not be regarded as a finite description of the work to be undertaken for the examination, but as a general indication of the areas to be covered. Residents are expected to be familiar with recent advances in Chemical Pathology and related disciplines.

1. **ROUTINE CHEMICAL PATHOLOGY**
   Metabolic Medicine
   - **Liver disorders**
     Jaundice, loss of appetite
   - **Acid-base disorders**
     Multi-organ failure, hyperventilation
   - **Fluid and electrolyte disorders**
     Dehydration, periodic paralysis
   - **Renal disorders**
     Uraemic syndrome
   - **Cardiac Biomarkers**
     Chest pain, dyspnoea
   - **Gastric, pancreatic and intestinal disorders**
     Vomiting, diarrhoea
   - **Mineral and bone metabolism**
     Bone pains, fractures, bowing of legs
   - **Lipid disorders**
     Dyslipidaemia, skin nodules
   - **Protein disorders**
     Failure to thrive, infections
   - **Porphyria**
     Abdominal pain, skin rash
   - **Iron disorders**
     Easy fatigability, dyspnoea
   - **Uric acid disorder**
     Joint pains
   - **Autoimmune disorders**
     Rheumatoid arthritis
     Systemic lupus erythmatosus

Endocrinology

- **Diabetes mellitus and hypoglycemia**
  Diabetic symptoms, symptomless hyperglycaemia, Fainting
- **Thyroid disorder**
  Palpitation, insomnia, weight gain, lethargy
- **Adrenal disorder**
  Swelling face and body, weakness, hypotension, Hypertension
- **Growth disorder**
  Short stature, giant, dysmorphism
- **Reproductive endocrinology**
  Infertility, hirsuitism, menstrual irregularity
- **Miscellaneous (endocrines)**

2. SPECIAL DIAGNOSTICS

- **Tumor Markers**
  Swellings, urinary symptoms, diarrohea, constipation, cough, chest pain
- **Vitamins and Trace Elements**
  Skin lesions, diarrhoea in children, bone pains, fractures, bowing of legs
- **Therapeutic Drug Monitoring**
  Clinical features of drug over dosage or toxicity
- **Clinical toxicology**
  Poisoning, unconsciousness, vomiting, breathlessness
- **Pediatric metabolic disorders**
  - Failure to thrive, fits, atonia, dysmorphism, dyspnea
- **Newborn Screening**
- **Nutrition**
  Weight loss, failure to thrive
- **Biochemical aspects of Haematology**
  Anaemia, Dyspnea, weakness
- **Maternal Biochemical Screening**
  Pregnancy
- **Biochemical Disorders of pregnancy**
  Jaundice in pregnancy, other symptoms
- **Miscellaneous (special diagnostics)**

3. **RECENT ADVANCES IN CHEMICAL PATHOLOGY**
   - Recent advances in metabolic medicine e.g. introduction of a new diagnostic marker
   - Recent advances in endocrinology e.g. introduction of a new diagnostic marker
   - Recent advances in any of the special diagnostics

4. **LABORATORY MANAGEMENT AND LABORATORY TECHNIQUES / METHODS**
   - **Laboratory Management**
     Lab safety
     Pre analytical conditions (specimen collection/ processing)
     Clinical utility of lab tests
     Method Validation
     Total Quality Management
     Reference values
     Computers in Laboratory/LIMS
     Planning and Laboratory Administration
     Lab Accreditation
     POCT
     Miscellaneous e.g. water purification
   - **Laboratory Techniques/Instrumentation**
     Optical techniques
     Electrochemistry
     Osmometry
     Electrophoresis
     Chromatography
     Mass spectrometry
     Immunochemical techniques
     Automation

- **Analytical Methods**
  Electrolytes
  Blood gases and pH
  Proteins
  Enzymes
  Lipids
  Carbohydrates
  Bilirubin iron and haemoglobin
  Uric Acid
  Urea and Creatinine
- **Molecular Diagnostics**
  Amplification Techniques
  Gene Sequencing
  Next Generation Sequencing

CORE COMPETENCIES

The procedural competencies, a specialist must have, are varied and complex. A list of core procedural competencies is given below. The level of competencies to be achieved each year is specified according to the given key:

Key to competency levels in clinical skills:

1. Observer Status
2. Assistant Status
3. Performed Under Supervision
4. Performed Under Indirect Supervision

COMPETENCIES	R-3								TOTAL NO. OF CASES
	3 MONTHS		6 MONTHS		9 MONTHS		12 MONTHS		
	Level	Cases	Level	Cases	Level	Cases	Level	Cases	
INTERPRET AND REPORT									
• TESTS OF ELECTROLYTE DISORDERS	2	10	2	10	3	10	3	10	40
• TESTS OF ACID BASE DISORDERS	2	10	2	10	3	10	3	10	40
• LIVER FUNCTION TESTS	2	10	2	10	3	10	3	10	40
• RENAL FUNCTION TEST	2	10	2	10	3	10	3	10	40
• CARDIAC BIOMARKERS	2	10	2	10	3	10	3	10	40
• TESTS OF LIPID DISORDERS	2	10	2	10	3	10	3	10	40
• TESTS OF DISORDERS OF PLASMA PROTEINS	2	10	2	10	3	10	3	10	40
• TESTS OF DISORDERS OF URIC ACID	2	10	2	10	3	10	3	10	40
• TESTS OF DISORDERS OF IRON METABOLISM	2	10	2	10	3	10	3	10	40
• THYROID FUNCTIONS TESTS	2	10	2	10	3	10	3	10	40
• TESTS OF ADRENAL DISORDERS	1	5	2	5	3	5	3	5	20
• TESTS OF MALE REPRODUCTIVE DISORDERS	1	5	2	5	3	5	3	5	20
• TESTS OF FEMALE REPRODUCTIVE DISORDERS	1	5	2	5	3	5	3	5	20
• TESTS OF GROWTH DISORDERS	1	5	2	5	3	5	3	5	20

COMPETENCIES	R-3								TOTAL NO. OF CASES
	3 MONTHS		6 MONTHS		9 MONTHS		12 MONTHS		
	Level	Cases	Level	Cases	Level	Cases	Level	Cases	
TESTS FOR INHERITED METABOLIC DISORDERS (PAEDS)	1	2	2	2	3	2	3	2	8
PERFORM END-POINT TESTS ON SEMIAUTOMATED ANALYZERS	2	10	2	10	3	10	3	10	40
PERFORM KINETIC TESTS ON SEMIAUTOMATED ANALYZERS	2	10	2	10	3	10	3	10	40
PERFORM TESTS ON AUTOMATED CHEMICAL PATH ANALYZERS	2	10	2	10	3	10	3	10	40
PERFORM TESTS ON ISE INSTRUMENTS	2	10	2	10	3	10	3	10	40
PERFORM TESTS ON ELISA / OTHER IMMUNOASSAY READERS	2	5	2	5	3	5	3	5	20
PERFORM TESTS ON CHEMILUMINESCENCE AUTO ANALYSERS	2	10	2	10	3	10	3	10	40
CARRY OUT TROUBLE SHOOTING FOR INTERNAL QC	2	10	2	10	3	10	3	10	40
CARRY OUT TROUBLE SHOOTING FOR EXTERNAL QC	2	10	2	10	3	10	3	10	40

COMPETENCIES	R-3								TOTAL NO. OF CASES
	3 MONTHS		6 MONTHS		9 MONTHS		12 MONTHS		
	Level	Cases	Level	Cases	Level	Cases	Level	Cases	
INTERPRETING RESULTS OF:									
• TUMOUR MARKER TESTS	1	5	2	5	2	5	3	5	20
• THERAPEUTIC DRUG MONITORING	1	5	2	5	2	5	3	5	20
• CLINICAL TOXICOLOGY TESTS	1	5	2	5	2	5	3	5	20
• VITAMINS, MINERALS & TRACE ELEMENTS TESTS	1	5	2	5	2	5	3	5	20
• NUTRITIONAL DISORDER TESTS	1	5	2	5	2	5	3	5	20
• TESTS FOR DISORDERS OF PREGNANCY	1	5	2	5	2	5	3	5	20
ESTABLISHING REFERENCE VALUES OF BIOCHEMICAL PARAMETERS	1	5	2	5	2	5	3	5	20
PERFORM ELECTROPHORESIS	1	5	2	5	2	5	3	5	20
MAINTAIN WATER PURIFICATION SYSTEMS	1	5	2	5	2	5	3	5	20
PERFORM STONE ANALYSIS	1	5	2	5	2	5	3	5	20

COMPETENCIES	R-3								TOTAL NO. OF CASES
	3 MONTHS		6 MONTHS		9 MONTHS		12 MONTHS		
	Level	Cases	Level	Cases	Level	Cases	Level	Cases	
ORGANIZE TOTAL LAB AUTOMATION*	1	5	2	5	2	5	2	5	20
ESTABLISHING DIAGNOSTIC ACCURACY OF TESTS	1	5	2	5	2	5	3	5	20
CARRY OUR METHOD VALIDATION OF LAB TESTS	1	5	2	5	2	5	3	5	20
ORGANIZE LABORATORY ACCREDITATION SYSTEMS	-	-	-	-	-	-	-	-	
UTILIZE RECENT UPDATES IN TESTS OF CHEMICAL PATHOLOGY	1	5	2	5	2	5	3	5	20
DEMONSTRATE COMMUNICATION SKILLS E.G. BREAKING BAD NEWS, HANDLING ANGRY PERSONS, COUNSELLING AND NEGOTIATING WITH VENDORS	1	5	2	5	2	5	3	5	20

COMPETENCIES	R-4								TOTAL NO. OF CASES
	15 MONTHS		18 MONTHS		21 MONTHS		24 MONTHS		
	Level	Cases	Level	Cases	Level	Cases	Level	Cases	
INTERPRET AND REPORT									
• TESTS OF ELECTROLYTE DISORDERS	-	-	-	-	4	10	4	10	20
• TESTS OF ACID BASE DISORDERS	-	-	-	-	4	10	4	10	20
• LIVER FUNCTION TESTS	-	-	-	-	4	10	4	10	20
• RENAL FUNCTION TESTS	-	-	-	-	4	10	4	10	20
• CARDIAC BIOMARKERS	-	-	-	-	4	10	4	10	20
• TESTS OF LIPID DISORDERS	-	-	-	-	4	10	4	10	20
• TESTS OF PLASMA PROTEINS DISORDERS	-	-	-	-	4	10	4	10	20
• TESTS OF DISORDERS OF URIC ACID	-	-	-	-	4	10	4	10	20
• TESTS OF DISORDERS OF IRON METABOLISM	-	-	-	-	4	10	4	10	20
• THYROID FUNCTIONS TESTS	-	-	-	-	4	10	4	10	20
• TESTS OF ADRENAL DISORDERS	-	-	-	-	4	5	4	5	10
• TESTS OF MALE REPRODUCTIVE DISORDERS	-	-	-	-	4	5	4	5	10
• TESTS OF FEMALE REPRODUCTIVE DISORDERS	-	-	-	-	4	5	4	5	10
• TESTS OF GROWTH DISORDERS	-	-	-	-	4	5	4	5	10

COMPETENCIES	R-4								TOTAL NO. OF CASES
	15 MONTHS		18 MONTHS		21 MONTHS		24 MONTHS		
	Level	Cases	Level	Cases	Level	Cases	Level	Cases	
TESTS FOR INHERITED METABOLIC DISORDERS (PAEDS)	-	-	-	-	4	2	4	2	4
PERFORM END-POINT TESTS ON SEMIAUTOMATED ANALYZERS	-	-	-	-	4	10	4	10	20
PERFORM KINETIC TESTS ON SEMIAUTOMATED ANALYZERS	-	-	-	-	4	10	4	10	20
PERFORM TESTS ON AUTOMATED CHEMICAL PATH ANALYZERS	-	-	-	-	4	10	4	10	20
PERFORM TESTS ON ISE INSTRUMENTS	-	-	-	-	4	10	4	10	20
PERFORM TESTS ON ELISA / OTHER IMMUNOASSAY READERS	-	-	-	-	4	5	4	5	10
PERFORM TESTS ON CHEMILUMINESCENCE AUTO ANALYSERS	-	-	-	-	4	10	4	10	20
CARRY OUT TROUBLE SHOOTING FOR INTERNAL QC	-	-	-	-	4	10	4	10	20
CARRY OUT TROUBLE SHOOTING FOR EXTERNAL QC	-	-	-	-	4	10	4	10	20

COMPETENCIES	R-4								TOTAL NO. OF CASES
	15 MONTHS		18 MONTHS		21 MONTHS		24 MONTHS		
	Level	Cases	Level	Cases	Level	Cases	Level	Cases	
INTERPRET AND REPORT:									
• TUMOUR MARKER TESTS	-	-	-	-	4	5	4	5	10
• THERAPEUTIC DRUG MONITORING	-	-	-	-	4	5	4	5	10
• CLINICAL TOXICOLOGY TESTS	-	-	-	-	4	5	4	5	10
• VITAMINS, MINERALS & TRACE ELEMENTS TESTS	-	-	-	-	4	5	4	5	10
• NUTRITIONAL DISORDER TESTS	-	-	-	-	4	5	4	5	10
• TESTS FOR DISORDERS OF PREGNANCY	-	-	-	-	2	5	2	5	10
ESTABLISHING REFERENCE VALUES OF BIOCHEMICAL PARAMETERS	-	-	-	-	4	5	4	5	10
PERFORM ELECTROPHORESIS	-	-	-	-	4	5	4	5	10
MAINTAIN WATER PURIFICATION SYSTEMS	-	-	-	-	4	5	4	5	10
PERFORM STONE ANALYSIS	-	-	-	-	4	5	4	5	10
PERFORM TESTS BASED ON CHROMATOGRAPHY*	-	-	-	-	2	5	2	5	10
PERFORM TESTS ON HPLC, GC-MS AND TRIPLE QUAD*	-	-	-	-	2	5	2	5	10

COMPETENCIES	R-4								TOTAL NO. OF CASES
	15 MONTHS		18 MONTHS		21 MONTHS		24 MONTHS		
	Level	Cases	Level	Cases	Level	Cases	Level	Cases	
PERFORM TESTS BASED ON ATOMIC ABSORPTION*	-	-	-	-	2	5	2	5	10
ORGANIZE TOTAL LAB AUTOMATION*	-	-	-	-	2	5	2	5	10
ESTABLISHING DIAGNOSTIC ACCURACY OF TESTS	-	-	-	-	4	5	4	5	10
CARRY OUR METHOD VALIDATION OF LAB TESTS	-	-	-	-	4	5	4	5	10
ORGANIZE LABORATORY ACCREDITATION SYSTEMS	-	-	-	-	2	5	2	5	10
UTILIZE RECENT UPDATES IN TESTS OF CHEMICAL PATHOLOGY	-	-	-	-	4	5	4	5	10
DEMONSTRATE COMMUNICATION SKILLS E.G. BREAKING BAD NEWS, HANDLING ANGRY PERSONS, COUNSELLING AND NEGOTIATING WITH VENDORS	-	-	-	-	4	5	4	5	10

*IF THE FACILITIES FOR THE PRESCRIBED PERFORMACE ARE NOT AVAILABLE THE SUPERVISOR SHALL ARRANGE FOR THE DEVELOPMENT OF THESE COMPETENCIES BY VISITING OTHER INSTITUTES OR BY ATTENDING ONLINE COURSE AND PHYSICAL WORKSHOPS ON THESE TECHNIQUES.

ROTATIONS	Level	Cases
CLINICAL ROTATION IN INTERNAL MEDICINE (3 MONTHS)		
CLINICAL ASSESSMENT, LABORATORY TESTS AND MANAGEMENT OF:		
• DIABETES MELLITUS	3	5
• HYPOGLYCAEMIA	3	5
• OBESITY	3	5
• DYSLIPIDEMIA	3	5
• METABOLIC SYNDROME	1	5
• NUTRITIONAL DISORDERS	3	5
• HYPERTENSION / CRITICALLY ILL PATIENTS IN INTENSIVE CARE UNITS	3	5
• OSTEOPOROSIS / OSTEOMALACIA	3	5
• THYROID DISORDERS	3	5
• PARATHYROID DISORDERS	3	5
• ADRENAL DISORDERS	3	5

ROTATIONS	Level	Cases
CLINICAL ROTATION IN PAEDITRICS (3 MONTHS)		
CLINICAL ASSESSMENT, LABORATORY TESTS AND MANAGEMENT OF:		
GROWTH DISORDERS	2	5
CONGENITAL ADRENAL HYPERPLASIA	2	5
INHERITED METABOLIC DISORDERS (INBORN ERRORS OF METABOLISM)	2	5
CRITICALLY ILL PATIENTS IN NEONATAL INTENSIVE CARE UNITS	2	5

ASSESSMENT

FORMATIVE ASSESSMENT:

In accordance of CPSP policy to introduce Work Place Based Assessment in its fellowship programmes, Chemical Pathology is starting Direct Observation of Procedural Skills (DOPS) in its residency programme. A generic form for DOPS has been develped as under:

COLLEGE OF PHYSICIANS AND SURGEONS PAKISTAN

DIRECT OBSERVATION OF PROCEDURAL SKILLS (DOPS)

Specialty: **FCPS CHEMICAL PATHOLOGY**

Time Duration = 20 mins (15 mins assessment and 5 mins feedback)

PLEASE COMPLETE THE QUESTIONNAIRE BY FILLING/CHECKING APPROPRIATE BOXES

Assessor: _____ **Assessment Date:** _____

Resident`s Name: _____

Hospital Name: _____ **R&RC Number:** _____

Year of Residency: ☐ R3 ☐ R4

Quarter: ☐ 1st ☐ 2nd ☐ 3rd ☐ 4th

Setting: ☐ O.T. ☐ Procedure Room Other: _____

Diagnosis of Patient: _____ **Patient Age:** _____ **Sex:** _____

Name of Procedure: _____

Complexity of Case/ Procedure: ☐ Low/Easy ☐ Moderate/Average ☐ High/Difficult ☐ N/A

Number of times procedure performed by Resident: _____

Please grade the following areas on the given scale:	**Not Observed / Applicable**	**Below Expectations**		**Satisfactory**	**Above Expectation**	**Excellent**
		1	**2**	**3**	**4**	**5**
Describes principles of the method						
Compliance with laboratory documentation and manuals						
Completes assay successfully and produces a valid result that is able to be reported						
Explains the QC procedures for this method, including internal and external QA						
Identifies anomalies and resolves uncertainties for the method						
Explains maintenance and trouble-shooting requirements for the method						
Presentation skills						
Professionalism						
Overall ability to perform procedure or handle instrument						

Assessor's Satisfaction with DOPS:

(Low) 1 2 3 4 5 (High)

Resident's Satisfaction with DOPS:

(Low) 1 2 3 4 5 (High)

Strenghts	**Suggestions for Improvement**

Encounter to be repeated ☐ **YES** ☐ **NO**

_____

Signature

LIST OF TOPICS (QUARTER-WISE) FOR DOPS:

	R-3				R-4			
	QUARTER-1	QUARTER-2	QUARTER-3	QUARTER-4	QUARTER-1	QUARTER-2	QUARTER-3	QUARTER-4
DIFFERENT TECHNIQUES AND PROCEDURES REQUIRED DURING TRAINING								
MULTI-TEST AUTOMATED ANALYZER (EG: TOTAL LAB AUTOMATION) FOR ROUTINE CHEMISTRIES	4	3	2	2	-	-	1	1
MULTI-TEST AUTOMATED ANALYZER (EG: TOTAL LAB AUTOMATION) FOR IMMUNOASSAYS	4	3	2	2	-	-	1	1
POINT OF CARE TEST ANALYSIS AND ASSOCIATED QUALITY MEASURES (E.G, ABG, TROPONIN, BLOOD GLUCOSE)	4	3	2	2	-	-	1	1
SPECIALIZED PROTEIN METHODS - ELECTROPHORESIS, IFE, OLIGOCLONAL	3	3	2	2	-	-	1	1
DRUGS/TOXICOLOGY ANALYSIS (CLINICAL TOXICOLOGY, THERAPEUTIC DRUG MONITORING, FORENSIC TOXICOLOGY, DRUGS OF ABUSE)	3	3	2	2	-	-	1	1
CHROMATOGRAPHY (EG THIN LAYER CHROMATOGRAPHY, HIGH PERFORMANCE LIQUID CHROMATOGRAPHY)					-	-	2	2

	R-3				R-4			
	QUARTER-1	QUARTER-2	QUARTER-3	QUARTER-4	QUARTER-1	QUARTER-2	QUARTER-3	QUARTER-4
MASS SPECTROMETRY-TARGETED METABOLOMICS (GCMS, LCMSMS, FTIR)					-	-	2	2
TRACE METAL TECHNIQUES (E.G. ATOMIC ABSORPTION, ICPMS)					-	-	2	2
MOLECULAR TECHNIQUES (PCR, NGS)					-	-	2	2
PROFICIENCY TESTING OR EXTERNAL QC (FOLLOW THROUGH ALL STAGES OF PROCESSING)	3	3	2	2	-	-	1	1
TRIAL A NEW TEST IN PARALLEL WITH AUTOMATED TEST (EG: PERFORMING METHOD VALIDATION STUDIES)	2	2	1	1	-	-	1	1
DYNAMIC FUNCTION TESTS (EG. GROWTH HORMONE INSULIN, SHORT SYNACTEN, SWEAT CHLORIDE, ORAL GLUCOSE TOLERANCE TEST)	4	4	3	3	-	-	1	1

NOTE:

- R4 in quarters one and two will be on mandatory clinical rotations
- Only those instruments are included in DOPS which cannot be assessed in FCPS-II TOACS exam
- For those facilities/instruments which are not available at training centers, all efforts should be made for collaborations amongst institutes for enhancing trainees teaching-learning environment and opportunities
- The DOPS sessions are to be accompanied by constructive feedback for improvement.
- The sessions are to be reported electronically on e-log through the prescribed form.

SUMMATIVE ASSESSMENT:
ELIGIBILITY REQUIREMENTS FOR FCPS-II EXAMINATION

- Passed IMM in Pathology, or has been granted exemption by CPSP
- Undertaken 2 years of the specified R&RC registered training in Chemical Pathology, all of which should be after completing IMM training or grant of exemption by CPSP
- To have completed e-logbook entries that are duly verified by the supervisor
- To provide a certificate of submission of dissertation or acceptance of two research papers in CPSP approved Journal(s)
- To provide complete log of CPSP mandated DOPS
- To provide certificate of completion of 3-month rotations each in General Medicine and Paediatrics

EXAMINATION SCHEDULE

- CPSP theory examinations may be held once or twice a year depending upon the number of candidates.
- Theory examinations are held in various cities of the country usually at Abbottabad, Bahawalpur, Faisalabad, Hyderabad, Islamabad, Karachi, Lahore, Larkana, Multan, Peshawar, Quetta and Rawalpindi centres. The College shall decide where to hold oral/practical examination depending on the number of residents in a city and shall inform the residents accordingly.
- English shall be the medium of examination for the theory/ practical/ clinical and viva examinations.
- The College will notify of any change in the centres, the dates and format of the examination.
- A competent authority appointed by the College has the power to debar any resident from any examination if it is satisfied that such a resident is not a fit person to take the College examination because of using unfair means in the examination, misconduct or other disciplinary reasons.
- Each successful resident in the Fellowship examination shall be entitled to the award of a College Diploma after being elected by the College Council and payment of registration fees and other dues.

EXAMINATION FEES

- Fees deposited for a particular examination shall not be carried over to the next examination in case of withdrawal/ absence/exclusion.
- Applications along with the prescribed examination fees and required documents must be submitted by the last date notified for this purpose before each examination.
- The details of examination fee & fees for change of centre, subject, etc. shall be notified before each examination.

REFUND OF FEES

If, after submitting an application for examination, a resident decides not to appear, a written request for a refund must be submitted before the last date for withdrawal with the receipt of applications. In such cases a refund is admissible to the extent of 75% of fees only. No request for refund will be accepted after the closing date for receipt of applications.

If an application is rejected by the CPSP, 75% of the examination fee will be refunded, the remaining 25% being retained as a processing charge. No refund will be made for fees paid for any other reason, e.g. late fee, change of centre/subject fee, etc.

FORMAT OF EXAMINATIONS

Every resident applying for the Fellowship of the College of Physicians and Surgeons Pakistan must pass both parts of the Fellowship examination. The College in it's endeavor to improve and upgrade it's examination system & make it more fair and resident friendly has introduced objective & structured examination tools such as TOACS (Task Oriented Assessment of Clinical Skills) and MCQs. However any change in examination format is made after notifying residents well in advance.

Theory Examination:
The written examination consist of two papers:
Paper I: 100 Single Best Answer (MCQs)
Paper II: 100 Single Best Answer (MCQs)

Only those candidates who qualify in theory will be called for clinical/practical examination. Detailed instructions will be sent out to all residents who pass the theory exam regarding the date and venue of the clinical/practical exam.

CLINICAL AND PRACTICAL EXAMINATION

Component-1:
TOACS: 13-15 Stations. All stations will be interactive

- **Station-1-2:** External Quality Assessment and other tools like delta check, six sigma and lean managment
- **Station-3:** Method Validation (Interpretation of data, Identification of curves, Basic Statistics
- **Station-4-6:** Clinical Diagnosis based on patients or images
- **Station-7:** Rest Station(s) (depending on the number of candidates)
- **Station-8:** Inventory Management / Cost Calculation
- **Station-9-10:** In depth interpretation of clinical cases (handing over the lab data to the residents in layers)
- **Station-11:** Communication Skills (stress-management) and Communication Skills (residents / lab staff)
- **Station-12:** Lab safety
- **Station-13:** e-logbook and Research Project(s)

Note:
- The list above is just a guideline. The examiners may change the content and order of the stations as deemed necessary.
- The examination may be conducted in more than one groups groups depending on the number of examiners and candidates.

Only those candidates who pass through TOACS examination will be allowed to appear in the remaining components of clinical examination.

Component-2:
(Analytical Techniques and Instrumentation)

Proficiency of residents in analytical techniques and instrumentation will be assessed in this component. It will be conducted in circuit of 10 interactive stations with 6 minutes for each station as following.

- **Five Stations:** Will consist of operation, maintenance and quality assurance of basic laboratory instruments (2 instruments per station)
- **Rest Station(s):** Number depends on the number of candidates
- **One Station:** On programming of the semi-automatic or fully automatic instrument or POCT device
- **One Station:** On interpretation of tracing from an Instrument e.g. electrophoresis or HPLC or a reading from a POCT device
- **One Station:** On handling common lab problems.
- **One Station:** On analytical Calculations e.g. HOMA-IR, Osmolality, molar absorptivity
- **One Station:** On interpretation of urine tests and calculation of urine indices.

Note: The examination may be conducted in mutiple groups depending on the number of examiners and candidates but all stations have to be interactive.

Component-3:
(Structured Assessment of Analytical Skills (SAAS)

This component is meant to assess purely the analytical skills attained by the resident during the training. It will be divided into two parts:

Assessed through SAAS-1 (45 Min 7.5 Marks): Resident will be given an unknown sample and will be required to do the test in 45 min using a semi-automated analyser. The result will be matched with key of the result. It is important to note that the key is to be prepared by testing the same sample using the same analytical reagent kit on a semi-automatic analyser. Marks given in an objective manner as per following formula:

$$\text{Error (\%Bias)} = \frac{\text{Key Result} - \text{Resident Result}}{\text{Key Result}} \times 100$$

Important Note: Resident will be required to show the result to the examiner on the instrument and get it signed.

Marks Allocation:

- Error (%Bias) < 10% : Full Marks
- Error (%Bias) 10% - 30% : 75% Marks
- Error (%Bias) > 30% : Zero Marks

Table Viva: (15 min 2.5 marks)
Examiner will ask about the details of the analytical technique and analytical method used.

SAAS-2 (45 Min 7.5 Marks) : Kinetic Test
Resident will be given an unknown sample and will be required to do the test in 45 minutes using a semi-automated analyser. The result will be matched with the key. It is important to note that the key will be prepared by testing the same sample using the same analytical reagent kit on a semi-automatic analyser. Marks will be given in an objective manner as per following formula:

$$\text{Error (\%Bias)} = \frac{\text{Key Result} - \text{Resident Result}}{\text{Key Result}} \times 100$$

Important Note: Resident will be required to show the result to the examiner on the instrument and get it signed.

Marks allocation:

- Error (%Bias) < 15% : Full Marks
- Error (%Bias) 15% - 40% : 75% Marks
- Error (%Bias) > 40% : Zero Marks

Table Viva: (15 min 2.5 marks)
Examiner will ask about the details of the analytical technique and analytical method used

Component-4:
(Quality Assurance)

There will be two parts:

- Quality Control
- Method Validation

Quality Control: (30% marks) (Time One Hour): Plotting and interpretation of Levey-Jennings (LJ) Plots and application of Westgards Rules.

Method Evaluation Assessment Tool (MEAT): (70% marks)
(Time two Hours):
Important Features:

- A standardized exam will be given to all residents for a fair chance of success
- In-house key will be prepared before the examination and marking of result will be carried out objectively by comparing the result with target value using following formula (where applicable):
  Target Result - Candidate's Result / Target SD
- One of the following parameters will be assessed:
  - Replication Study (20 replications)
  - Linearity Study
  - Recovery Study
  - Interference Study
  - Comparison of Methods

Component-5:
(Quick Assessment of Data Interpretation Skills (QADIS)

- Twenty Five (25) data rich cases are projected on screen
- Each case has two questions
- Time for each case is 2 minutes
- The questions may require one of the following answers from resident:
  - Most probable diagnosis
  - Differential diagnosis
  - Suggestion of any confirmatory test for that diagnosis.

The time allocation for these twenty-five cases will be 50 minutes.

RECOMMENDED RESOURCES

Books:

1. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics. SAUNDERS (Elsevier). Philadelphia, US. (Latest Edition)
2. Kaplan LA and Pesce AJ, Clinical Chemistry: Theory, Analysis, Correlation.. MOSBY (Elsevier). (Latest Edition)
3. Chemical Pathology for the Beginners. Azeem Academy, Lahore Pakistan (Latest Edition)
4. Guide to Diagnostic Clinical Chemistry by R. N. Walmsley, G. H. White. (Latest Edition)
5. Clinical Chemistry by Marshall, William J and Bangert, Stephen. (Latest Edition)
6. Clinical Chemistry: Laboratory Management and Clinical Correlations by Kent Lewandrowski (Editor) (Latest Edition)
7. Clinical Practice Guidelines for Endocrinology Investigations. Available at: https://pscp.org.pk
8. Inherited Metabolic Disorders. Available at: https://pscp.org.pk/
9. Quick Assessment of Data Interpretation Skills (QADIS) in Metabolic Medicine. Available at: https://pscp.org.pk/

Journals:

1. Journal of College of Physicians and Surgeons Pakistan
2. Clinical Chemistry (Journal of American Association of Clinical Chemistry)
3. Annals of Clinical Biochemistry (UK)
4. Pakistan Journal of Pathology

Websites:

1. Up To Date at www.uptodate.com
2. EVOLVE at https://evolve.elsevier.com/Resources/1829_global_0001#/content/289414054
3. Distance Learning Programmes in Chemical Pathology. Available at: https://pscp.org.pk/
4. YouTube Channel: pakistansocietyofchemicalpathologists (for educational videos)

NOTE: The resident is required to fill a self-explanatory 'feedback proforma' at the end of the examination.

THE COLLEGE RESERVES THE RIGHT TO ALTER/AMEND ANY RULES/REGULATIONS

Any decision taken by the College on the interpretation of these regulations will be binding on the applicant.

Published: December 2021

Updated: March 2023

COLLEGE OF PHYSICIANS AND SURGEONS PAKISTAN
7th Central Street, Defence Housing Authority, Karachi-75500.
Phone No. 9926400-10, UAN: 111-606-606, Fax No. 99266432