"This prospectus is made under the provisions of the Universities Act, the Postgraduate Institute of Medicine Ordinance, and the General By-Laws No. 1 of 2016 and By-Laws No. 2 of 2016 for Degree of Doctor of Medicine(MD) and Board Certification as a Specialist"

POSTGRADUATE INSTITUTE OF MEDICINE
UNIVERSITY OF COLOMBO

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UNIVERSITY OF COLOMBO

Prospectus

Board Certification in Neuroradiology

(To be effective from the year 2016)

BOARD OF STUDY IN RADIOLOGY

AAAEC – 11.05.2016
BOM – 04.06.2016
Senate – 10.08.2016

Contents

1. Background / introduction

The Board of Study in Radiology (BOSR), from its inception in 1980, has endeavored meticulously to train and provide our country with well trained and Board Certified Specialists in General Radiology.

Although General Radiologists are able to provide optimal radiological services for the majority of diseases that come up in practice, ultra-specialist services are required in certain identified focused areas. To cater to this need, the BOSR has decided to start a training programme for Neuroradiology, a subspecialty in Radiology recognized and approved by the Ministry of Health and PGIM.

The mission of this endeavour is to produce appropriately selected, properly trained, exquisitely competent and holistically caring Neuroradiologists who can provide state-of-the-art Neuroradiology services. The Neuroradiologist is expected to provide specialty services to patients who need advanced imaging in managing neurological diseases.

The goal is coverage of all areas of the country with the provision of Specialized Units managed by Neuroradiologists in all Teaching Hospitals and Provincial General Hospitals in the initial stage.
It is necessary to make sure that the Ministry of Health is kept informed from the outset that separate specialized Neuroradiology Units should be established along with Neurosurgery and Neurology units and to which Neuroradiologists would be appointed.

2. Eligibility for entry into training programme

a. Successful completion of MD Radiology examination held immediately before the allocation meeting.
b. Trainee should not be previously Board Certified by the PGIM in any Specialty or Subspecialty.

3. Selection process

Initial selection is by order of merit in the MD Radiology examination of the relevant year and the trainee's preference for the subspecialty.

The selected candidates would be provided with full and comprehensive details of the training programme on subspecialty training in Neuroradiology. This would be made available by the board of study in radiology for perusal by prospective candidates prior to the Allocation Meeting.

4. Number to be selected for training

Available training opportunities will be indicated by the PGIM in the public circular for the Radiology MD examination. The number of candidates will be predetermined and approved each year by the Board of Study in Radiology and Board of Management in consultation with the Ministry of Health.

5. Outcomes, competences and learning objectives

The programme is designed to provide comprehensive training that would equip the final trained specialist to deal with all types of Neuroradiology imaging services that are required in the

management of patients with neurological disorders. It is expected that the fully trained specialist would be up-to-date with all recent developments and would be in a position to provide expert services of a Specialist Neuroradiologist.

At the end of the training programme the trainee should have developed the following capabilities.

5.1.1. Patient care

The ultimate aim is to provide comprehensive and specialized diagnostic Neuroradiology services to patients.

The trainees should be able to determine the infrastructure facilities required for optimal services to patients with neurological disorders and make fervent efforts to acquire such facilities.

5.1.2. Medical knowledge

It is expected that the trainees should acquire extensive and up-to-date knowledge on neurological disorders during the course of the training programme. Wide reading and critical thinking together with reflective documentation are essential attributes that should be developed during the training programme.

5.1.3. Interpersonal and communication skills

It is essential that the trainees develop the indispensable skills in communication and liaison with other colleagues and the staff of different units of a medical facility with whom they have to have a constant dialogue. A Neuroradiologist involves a multi-disciplinary approach in many instances and proper communication with all those involved in the management of patients is crucial to the provision of optimal care.

The trainees should also acquire the necessary skills and attitudes in maintaining a dialogue with the affected patients and their family members. Development of empathy and understanding of the problems faced by them would be an essential prerequisite to being a competent and successful Neuroradiologist.

5.1.4. Professionalism

It is envisaged that the trainees in Neuroradiology would act and behave in a most professional manner in all dealings with senior and junior colleagues and others involved in the management of patients. This is particularly relevant in neurological disorders to secure the services of several other para-medical categories of staff in the provision of comprehensive services to patients.

These attitudes and skills need to be carefully nurtured during the training programme.

5.1.5. Management Skills

In practice, the Neuroradiologist will be the team leader in the Neuroradiology Unit. In addition to the clinical radiology work, he/she is expected to carry out certain administrative duties of the unit to organize smooth functioning of the Unit.

6. Structure of training programme

The programme in Neuroradiology involves three years of post MD Radiology training.

The first year will be in General Radiology, in the common post MD Radiology rotation.

The second year will be local training in Neuroradiology, in a centre/centres approved by the BOSR.

The third year will be in a Neuroradiology centre overseas approved by BOSR.

6.1 Local Training

- Twelve months of post MD training rotation in General Radiology.
- Twelve months of local training in Neuroradiology which will include the following.

Subject	Duration
Clinical Neuroradiology	35 weeks
Interventional Neuroradiology	04 weeks
Neurology / Adult	04 weeks
Neurology / Paediatric	02 weeks
Neurosurgery	02 weeks
Neuropathology	02 Weeks
Neuroanaesthesia	01 week
Neurophysiology	01 week
Critical care and Emergency Medicine	01 week

6.2 Overseas Training

The overseas training component should be in a centre of excellence approved by the BOSR.

7. Content areas of the curriculum

The content areas of the curriculum are outlined in **Annex 1**

8. Learning activities

a. Regular multidisciplinary meetings with other units / departments
b. Participation in Continuing Medical Education activities
c. Participation in international meetings in Neuroradiology
d. Conduct audits
e. Conducting a research project is a mandatory component. Details of procedures for obtaining approval for the project, carrying it out and submitting the report are provided in **Annex 2.**
f. Engagement in teaching and training of undergraduate and postgraduate students
g. Maintaining a reflective training portfolio. The format and other details are given in **Annex 3.**

9. Trainers and Training Units

Trainers

Radiologists with not less than three years of experience after Board Certification and who are working full time in Neuro Trauma Units and at Neurosurgery Units will be appointed as trainers. Once Board certified Neuroradiologists are available, they will be considered as per PGIM guidelines.

Training Units

Training units must be accredited by the BOSR as suitable for training in subspecialty in Neuroradiology.

Currently available units are

NHSL - Neuroradiology Division, Neurotrauma Unit
MRI – NSU
Neurology Units
Neurosurgery Units
Pathology Department
Neuro ICU
Neurophysiology Unit
ICU of Accident service, MICU, Recovery Unit

LRH - Paediatric Neurology Unit

10. Monitoring progress

Each candidate would be allocated to a "Designated Supervisor" who shall guide the trainee throughout the training programme.

10.1 Progress of the trainee during the programme is assessed by the Designated Supervisor and other Trainers using the following:

Evaluation of Procedural Experience
Practice – based learning and improvement
Direct observation of procedures (DOPS)
Evaluation and assessment of the reflective training portfolio (Annex 3)
Peer Team Ratings (**Annex 4**)
Research/ Audits
Progress reports from local and overseas Trainers (**Annex 5**, **Annex 6**)

10.1 Eligibility for Final Assessment prior to Pre Board Certification Assessment

The following criteria have to be accomplished to be eligible to appear for the final assessment and PBCA.

i. Provision of satisfactory Progress Reports for ALL stages of training.
ii. Successful completion of research report /or publication of the Research Project.
iii. Successful conduct and presentation of the two Clinical Audits.
iv. Submitted three copies of the completed portfolio.

10.2 Final Assessment

The final assessment will take the form of an examination consisting of two components:

A) Film Packet Reporting (FPR).

5 film packets.

Duration – 15 minutes for each film packet.

Each packet will be marked by two independent examiners.

B) A Viva Voce Examination conducted by a panel of two examiners.
Duration - 30 minutes. 15 minutes will be allocated for each examiner.

The examiners would be appointed by the BOSR according to the rules and regulations laid down by the PGIM.

Allocation of marks

Film Packet Reporting .....- 100 marks
Viva Voce Examination ..... - 100 marks
TOTAL ..... - 200 marks

10.3 Pass mark

The candidate should obtain a minimum of 50% of the total 200 marks and secure a minimum of 50% in each of components (A) and (B), in order to be eligible for the Pre Board Certification Assessment (PBCA).

A failed candidate would need to attend a counselling session within two weeks of the assessment and sit for the final assessment again within a period of three months. The candidate would need to repeat only the component/s in which he or she failed.

If unsuccessful at the second attempt, the trainee will have to undergo further training for a minimum period of six months in a unit allocated by the BOSR before subsequent attempts at the final assessment.

11. Format of Pre-Board Certification Assessment

After successful completion of the final assessment, all trainees should go through a Pre-Board Certification Assessment (PBCA).

12.1 Assessment tool

The PBCA should be based on assessment of the reflective training a portfolio maintained by the trainee during the period of post-MD training. The PBCA should take the form of afinal, summative assessment of the trainee's portfolio, carried out by two independent examiners (one of whom should be from outside the discipline to improve objectivity) appointed by the BOSR and approved by the Senate of the University of Colombo.

The trainee should be called for an oral examination, during which he/she will be questioned on the portfolio. The trainee shall be required to start with a 15 minutes presentation, on the post-MD training.

The overall assessment should be based on each of the main sections, which should be assessed as follows:

Excellent (5), Very good (4), Pass (3), Borderline (2), Fail (1)

If the overall grade obtained is borderline or fail, the examiners must provide the trainee with written feedback on how the portfolio should be improved in order to reach the required standard. The trainee should then re-submit the portfolio within a period of three monthsand face another PBCA based on the re-submitted portfolio.

On successful completion at the second attempt, the date of Board Certification shall be backdated according to PGIM general regulations and guidelines.

If unsuccessful at the second attempt, the trainee will have to undergo further training for a minimum period of six months in a unit allocated by the BOSR and improve in the deficient areas in the portfolio before sitting for the PBCA again.

If successful at 3rdor subsequent attempt, the date of Board Certification will be determined according to the PGIM general regulations and guidelines.

12. Board Certification

A trainee who has successfully completed the Pre-Board Certification Assessment with a grade of pass or above is eligible for Board Certification as a Specialist in Neuroradiology on the recommendation of the Board of Study in Radiology.
The date of Board Certification shall be determined by the general rules and regulations of the PGIM.

13.Recommended Books/Journals for reading

Refer **Annex 7** for recommended reading material.

Annex 1 - Content and Curriculum - Neuroradiology

1. Training Content and Curriculum

1.1 Introduction

1.1.1 This curriculum outlines the subspecialty training requirements in neuroradiology including interventional neuroradiology.

1.1.2 In Sri Lanka trainees will be selected to enter into neuroradiology subspecialty training following successful completion of the MD Radiology examination. This training is in diagnostic and interventional neuroradiology.

1.1.3 All trainees will have acquired basic knowledge of neuroradiology diagnosis during pre and post MD training and will already have acquired basic skills.

1.1.4 Having completed, one year of Post MD local training in General Radiology, selected subspecialty trainees will have to undergo two years of training in neuroradiology.

1.1.5 Dedicated neuroradiology training will be at a recognized neuroradiology centre approved by the Board of Study in Radiology.

1.1.6 The aim of subspecialty training in neuroradiology is to enable the trainee to become clinically competent and to consistently interpret the results of neuroradiological investigations accurately and reliably. Where appropriate, trainees should also be capable of providing a comprehensive and safe diagnostic service.

1.1.7 The training needs shall be flexible and appropriate to the needs of the institution/country. Neuroradiology is an expanding specialty with development in paediatric neuroradiology and functional brain imaging.

1.2 Objectives

1.2.1 The aim of establishing a curriculum for subspecialty training in Neuroradiology is to ensure that the trainee acquires:

- Knowledge of the relevant embryology and anatomy of the nervous system
- In-depth understanding of the relevant pathophysiological, and clinical aspects of neurological diseases
- In-depth understanding of the indications, contraindications and complications of imaging studies of neurological diseases
- In-depth understanding of the major imaging techniques relevant to Neuroradiology so that they can, with confidence, discuss with their colleagues the choice of best imaging method for a particular clinical problem
- Clinical knowledge relevant to Neuroradiology so that the trainee may confidently discuss patients with colleagues
- Direct practical exposure to interventional procedures to provide them with a full knowledge of the technical problems and risks of the procedures. Hands-on experience with graded supervision will be required by all trainees in Neuroradiology, but will vary from straightforward procedures to more complex procedures.
- Knowledge of the current developments in Neuroradiology.

1.2.2 The trainee should be fully competent in intermediate and advanced life –support (Formal ALS certificate should be obtained)

1.2.3 Experience will be documented and the procedures be recorded in a portfolio

1.2.4 If experience to fulfill the requirements of subspecialty training cannot be gained in one training centre, it will be necessary for the trainee to have a period of attachment(s) in other training centres.

1.2.5 The expected outcome at the end of this subspecialty training in Neuroradiology will be for the Senior Registrar to be competent in all aspects of diagnostic Neuroradiology.

1.3 Overview of training

1.3.1 It is expected that the trainee has undergone Training in Clinical Radiology, and has the core knowledge, skills and experience acquired during core training, together with the optional experience, in which practical experience is not essential but theoretical knowledge is required.

1.3.2 A training scheme responsible for training in Neuroradiology shall provide access to appropriate computed tomography (CT), magnetic resonance imaging (MRI), digital subtraction angiography, ultrasound (US)including neonatal cranial sonography and radionuclide imaging facilities.

1.3.3 Clinical knowledge shall be acquired by a variety of means. This will include close liaison with the appropriate surgical and medical teams and participation in combined clinical and radiological meetings. Clinical inter-relationships are necessary with:

- Neurosurgery (paediatric and adult)
- Neurology (paediatric and adult)
- Neuropathology
- Neurophysiology
- Neuroanaesthesia/critical care and emergency medicine
- Neuro trauma

Other specialties will also provide important training opportunities, in particular ophthalmology, otology, genetics, endocrinology, psychiatry, neuro-oncology, maxillofacial surgery, spinal surgery and rehabilitation services.

1.3.4 It may be appropriate for the trainee to have a regular attachment to ward rounds, outpatient clinics and theatre sessions in order acquire to further clinical knowledge relevant to the subspecialty.

1.3.5 The trainee should be encouraged and given the opportunity to attend and lead appropriate clinico-radiological meetings.

1.3.6 The trainee should participate in relevant clinical audit, management, and clinical governance, and have a good working knowledge of local and national guidelines in relation to radiological practice.

1.3.7 The trainee should be involved in research and have the opportunity to attend and present at national and international meetings. The progression of research projects

to formal peer-reviewed publication should be supported and encouraged by the supervising consultant(s).

1.3.8 Attendance at Neuroradiology workshops /Conferences(Local/Overseas)is compulsory.

1.3.9 The trainee is expected to participate in undergraduate and postgraduate teaching.

1.3.10 The trainee should continue to participate in the Senior Registrar Neuroradiology on-call after adequate training with appropriate consultant cover.

1.3.11 Subspecialty training in Neuroradiology is assessed and accredited by the Board of Study in Radiology.

1.4 Core knowledge

1.4.1 A comprehensive knowledge of normal brain function and neurological diseases, including:

- **Embryology, anatomy and physiology**

The embryology, anatomy, normal variants and physiology of the central and peripheral nervous system, organs of special senses, head and neck, and spine and spinal cord in adults and children

- **Pathology**

The pathological correlation of diseases and variations of the central nervous system, including the spine and cranium and disorders of the ophthalmological and otorhinolaryngological systems, including appropriate applications and interpretation of the various imaging modalities

- **Imaging guidelines**

Local, national and where appropriate, international imaging guidelines

- **Knowledge of physical principles and technical aspects of image formation**

1.4.2 Knowledge and understanding of the physical principles and technical background for the performance of CT, MRI, angiography, US, conventional imaging and myelography for the diagnostic imaging of the head, spine and spinal cord, neck and organs of special senses in adults and children. Exposure to magnetic resonance spectroscopy (MRS)/functional imaging and nuclear medicine studies [single photon emission computed tomography (SPECT), positron emission tomography (PET)] related to Neuroradiology should be available.

1.4.3 To develop the interpretative skills of CT, MRI, angiography, US, conventional imaging and myelography for the diagnostic imaging of the head, spine and spinal cord, neck and organs of special senses in adults and children be encouraged.

1.4.4 The Senior Registrar should know the inherent strengths and limitations of these modalities, as well as appropriate imaging protocols for neuroradiological consultation.

1.4.5 Knowledge of the techniques involved in the imaging used to evaluate and treat neurological diseases, including interventional procedures and the management of the complications of these procedures.

Drugs and contrast media

1.4.6 Knowledge of pharmacology, particularly with respect to contrast media and invasive procedures.

Radiation protection, safety and quality assurance

1.4.7 Knowledge of patient protection and safety in neuroradiology.
1.4.8 Understanding of fundamentals of quality assurance (management) in neuroradiology.

Comprehensive imaging of the brain

All types of imaging such as different types of x-rays, ultrasonic scanning including Doppler, Computerized Tomography, Magnetic Resonance Imaging MRI and Positron Emission Tomography (PET) and functional brain imaging techniques including spectroscopy &diffusion tensor imaging are imaging techniques in the training of Neuroradiology. Exposure to and competence in interpreting these investigations is an essential requirement for a Neuroradiologist.

1.4.9 **Skills development**
Acquisition of specific skills to enable competence in clinical neuroradiological skills in children and adults including:

- Diagnostic and interpretative skills
- Manual and procedural skills
- Basic endovascular and therapy skills (interventional radiology)
- Computer skills in imaging acquisition and post-processing
- The conduct, supervision and accurate interpretation of all imaging techniques used in the investigation of neurological diseases, to a high professional standard
- Good communication with patients and professional colleagues
- Competence in style of reporting
- Ability to manage post procedure care for invasive diagnostic, therapeutic techniques and neuroradiological emergencies
- Ability to manage patients and to obtain valid informed consent for all procedures
- Competence in effective consultation, presentation of scholarship material and

ability to teach neuroradiology to peers and residents in other disciplines
- Ability to evaluate medical literature critically and to conduct neuroradiological research
- Ability to conduct or supervise quality assurance

1.4.10 Research- Apart from the clinical responsibility, the candidate will have to undertake one elective research project either clinical experimental work with a formal protocol, under the supervision of faculties. He will be required to submit dissertations based on his work to Board of Study in Radiology during three year training.

Research and Publications- The candidate will be initiated into the field of Medical research and scientific publications relevant to Neuroradiology. The importance of designing appropriate methodology and data collection by making use of proformas and its use in identification of the crucial hospital as well as community based problems should be stressed. Clinical and experimental research oriented to understand, Analyze and improve upon the scientific knowledge pertaining to this discipline should be the aim of this exercise as well as appreciation of ethical issues involved in human research. He/She will be encouraged to publish such data from the research, in recognized journals in the last year of training.

1.4.11 During the training period it is recommended that the trainee receives the following training.

- CT
- MRI
- Angiography and interventional neuroradiology: 4 weeks
- Myelography/radiculography: the opportunity to observe, and whenever possible,
- US including neonatal spinal, cranial US and Doppler, trans cranial Doppler
- Presentations at Study/meetings
- Research methodology

1.4.12 The techniques listed and the time devoted to each will be reviewed at intervals along with the number of cases required, as it is recognized that some procedures may become obsolete and new techniques will be developed (e.g. functional brain imaging and magnetic resonance spectroscopy).

1.4.13 The trainee should become familiar with providing analgesia and/or sedation where required, as well as the necessary continuous monitoring required to perform this safely.

1.4.14 All Interventional trainees must have thorough knowledge of techniques of sedations and analgesia required to perform these procedures as well as patient monitoring throughout and following the procedures

1.4.15 Trainees should be aware of the full range of intra and post-operative complications and must be competent in their management.

1.4.16 Trainee should become fully aware of the local and National guidelines in obtaining inform patient consent.

1.5 General Guidelines

1.5.1 All Senior Registrars training in neuroradiology should have a basic understanding on interventional techniques so that they have full knowledge of indications, technical problems, contraindications and risk of procedures.

1.5.2 Trainees need to develop clinical judgment. The risks and benefits of each therapeutic procedure need to be appreciated. Clinical attachments are included in the Curriculum.

1.5.3 Trainees should have adequate exposure to neurosurgical operations and ward/high dependency unit management of acutely ill patients.

1.5.4 Regular involvement in neurosciences audit and mortality/morbidity meetings is necessary to understand risk management for different clinical conditions.

1.5.5 It is the responsibility of the trainee to be aware of the current local and national guidelines in obtaining informed patient consent.

1.5.6 Ethical, emotional -social, economic and legal aspects of Neuroimaging: Ethics of management modalities, use of contrast media, cost-effectiveness of imaging modalities, ethical and moral issues in neuroimaging research, statutory and legal implications in neuroimaging etc., need to be addressed.

1.6 Appraisal and assessment

1.6.1 Regular appraisal of the trainee and feedback is an important aspect of training.

1.6.2 Methods of assessments will include:

- Regular direct observation of clinical techniques (including communication skills, ability to obtain informed consent and sedation skills) by the trainer and/or external observer
- Regular formal review of the trainee's skills in the accurate interpretation of investigations for neurological diseases
- A final assessment of overall professional competence prior to the final record of in-training assessment (RITA) review

1.6.3 **Review of training Programme**

- It is expected that trainees will complete a portfolio for subspecialty training period undertaken.
- It is expected that the Board of Study in Radiology that is responsible for organizing subspecialty training will review and analyze these feedback forms and act appropriately to ensure that training complies with the relevant subspecialty curriculum. The analysis and subsequent actions should be formally recorded.
- The Board of Study in Radiology will regularly review these records to ensure that subspecialty training complies with the appropriate subspecialty curriculum.

1.6.4 **Review of subspecialty curriculum**

Board of Study in Radiology and Board of Management will regularly review this subspecialty curriculum to ensure that it complies along with advancement of neuroradiological practice.

Annex 2 - Research Proposal and Research Report

This annex contains the following details

A. Introduction- Research Proposal and Research Report
B. Format for writing a research proposal
C. Format for reviewers to report on research proposals
D. Guidance to supervisors of research projects
E. Format for progress reports
F. Format for Research Report

A. Introduction- Research Proposal and Research Report

All PGIM trainees are expected to undertake a research project, either during pre-MD or post MD training or both. Such a study should not include case reports, but may take the form of a well-designed audit.

The trainee should submit research proposals within two months of commencing post-MD training.

The research proposal must be submitted to the BOSR for approval before commencing the study.

The proposal should be evaluated by a reviewer nominated by the BOSR.

The proposal should have a reasonable timeline for completion. If the proposal is unsatisfactory, the reviewer may recommend modification of the proposal or submission of a different proposal. The trainee should commence the study only after obtaining approval of the BOSR and ethical clearance.

Relevant ethical clearance, and in the case of clinical trials, registration with a Clinical Trials Registry must be obtained prior to commencement of the study.

The trainee is required to nominate a primary supervisor for the project, usually the trainee's current trainer.

The trainee must submit six monthly progress reports through the primary supervisor to the BOSR. The supervisor should provide feedback to the trainee.

Acceptance of the research project by the BOSRmay be based on fulfilment of either of the following:

1. Publication of the research findings as an **original full paper** (not case reports) in a **peer-reviewed journal** (preferably indexed) with the trainee as first author. No further evaluation is required on the premise that a paper which is already peer-reviewed.
   OR
2. Submission of a detailed project report to the BOSR. This should be evaluated by two assessors nominated by the BOSR.

    a. If the project is considered unsatisfactory by both assessors, the trainee will be requested to revise and resubmit, with written feedback on the required revisions. If

the project report is still unsatisfactory, the trainee may, at the discretion of the BOSR, be asked to extend the same research project or undertake a new research project which will have to go through the same procedure of approval as the initial project.

b. If there is disagreement between the two assessors, with only one assessor's decision being 'unsatisfactory', the project report should be sent to a third assessor for a final decision.
c. Presentation of the research findings at a recognized scientific congress, either local or international, as oral or poster presentation, should be encouraged.

3. The criteria indicated in 1 and 2 above must be fulfilled prior to the PBCA.

B. Format for writing a research proposal

The aim of the research component is to plan and complete a scientific research project, with due appreciation of the need for scientific validity and ethical principles, within organizational and financial constraints. The choice of the research project will be primarily that of the trainee, but this should be discussed with and approved by the supervisor. The trainee should prepare a research proposal which will be submitted to the BOSR for approval prior to commencement of the study.

Time frame: the research proposal should be approved within the time period stipulated by the BOSR.

Format:

In general, the research proposal should be limited to 3000 words. The following structure is suggested:

- Title of the study
- List of investigators
- Collaborating institutions
- Background/introduction: this should include an overview of the subject related to the research project, with a relevant review of the literature.
- Justification: This section should provide a brief justification of the importance and relevance of the study proposed, including the feasibility of the study.
- Objectives: general and specific objectives of the study should be clearly defined.
- Methods: The methodology to be adopted to achieve the listed objectives should be given in detail; the following sub-sections are suggested as a guide:
    - Study design
    - Study period
    - Study population
    - Sample size calculation
    - Sampling technique
    - Study instruments
    - Data collection
    - Proposed statistically analysis
    - Ethic clearance and consent, and confidentiality of data
    - Proposed methods for dissemination of findings
- Annexes: the following annexes should be provided:

- Data proforma/s
- Consent forms, where relevant in all three languages
- Other relevant supporting documents

The trainees are advised to use Microsoft Word® for formatting documents. The software Endnote®, Reference Manager® or Mendelay® should be used, if possible, for citations. The reference format should follow the Vancouver® Style.

Both soft and hard copies of the documents should be submitted to the BOSR, through the supervisor.

C. Format for reviewers to report on research proposals

The reviewers of the research project should rate the research proposal as satisfactory or unsatisfactory. The main sections should be rated as satisfactory or unsatisfactory, and, if rated as unsatisfactory, specific comments should be provided. General statements should be avoided, and the reviewers should specifically what deficiencies are present and how they could be addressed.

Section	Satisfactory or Unsatisfactory	Remarks
Background		
Justification		
Objectives		
Methods		
Overall		

Recommendation: Accept as is / Revise and resubmit / reject

If a proposal is rejected altogether, the trainee will be expected to submit a new proposal.

D. Guidance to supervisors of research projects

1. The supervisor should guide the student in planning, carrying out research methodology and in presentation of the work, including the writing of the dissertation.

2. The supervisor should obtain recommendation of the research proposal from a reviewer.

3. The supervisor should forward progress report(s) in the prescribed form at the end of 3 months after the trainee commences work on the research project and 3 months after completing the project work.

4. The objective of the dissertation is to prove the trainee's capability to plan, carry out and present his/her own research. The purpose of this training is to ensurematurity, discipline and scholarship in research.

5. The dissertation should comprise the trainee's own account of his / her research.

6. It should be satisfactory as regards literary presentation.

7. The dissertation should be certified by the supervisor as suitable for submission.

8. General Comments on the contents: The objectives should be clearly stated and should be feasible to achieve within the time frame. Other published work relevant to the problem (both international and local) should becomprehensively covered and critically evaluated. The research methodology should achieve the objectives stated. The results should be presented effectively. The discussion should include comments on the significance of results, how they agree or differ from published work and theoretical / practical applications of the results, if any. The conclusions should be valid and be based on the results obtained on the study.

9. Ethics: The candidate should confirm and document that procedures followed were approved by the Ethical Committee of the institution where the work was carried out and ethical approval is obtained by a recognized Ethical Committee.

10. If at any time the supervisor is not satisfied with the work progress of the trainee, the trainee should be made aware of the deficiencies and corrective measures suggested. This should be conveyed in writing to the trainee with a copy to the BOSR. In such instances, a follow-up report should be forwarded within three months or earlier if necessary to the BOSR.

E. Format for progress reports

The progress reports should have the following components:

- By the trainee: Description of work carried out to date
- By the supervisor:
    - Whether the research project is progressing satisfactorily
    - Constraints
    - Whether the dissertation writing is on schedule
    - Whether overall progress is satisfactory

F. Format for Research Report

The following format should be adopted for research reports

The preliminaries should precede the text. They should comprise the following:

1. Title page

<Title of dissertation>

<Author's name>

MD (subject)
Post Graduate Institute of Medicine
University of Colombo
<Year of submission>

2. Statement of originality: This is a declaration that the work presented in the dissertation is the candidate's own, and that no part of the dissertation has been submitted earlier or concurrently for any other degree. The statement should be signed by the author, and countersigned by the supervisor.

3. Abstract: This should consist of a brief summary of not more than 350 words describing the objectives of the work, the materials and methods used, the results obtained, and the conclusions drawn. This may be in a structured format if helpful.

4. Table of contents: The table of contents immediately follows the abstract and lists in sequence, with page numbers, all relevant divisions of the dissertation, including the preliminary pages.

5. List of tables: This lists the tables in the order in which they occur in the text, with the page numbers.
6. List of figures: This lists all illustrative material (maps, figures, graphs, photographs etc.) in the order in which they occur in the text, with the page numbers.

Acknowledgments

1. Text

The Research Report should be divided into clearly defined sections. Sections may be subdivided.

Introduction: The aim of this section is to state briefly the current position and the reasons for carrying out the present work. Generally, only a few references should be cited here.

Literature Review: This section should be reasonably comprehensive, and most of the references to be quoted normally occur here. The relevant references dealing with the general problems should be reviewed first and this is followed by a detailed review of the specific problem. The review is in many cases approached as a historical record of the development of knowledge of the subject. This chapter should conclude with a brief statement of what you propose to find out.

Materials and Methods: These should be described so that a reader could repeat all the experiments. Where specific details are available in the literature, reference should be made to the original papers, and comments kept to a minimum. If modifications have been made to the published techniques, these should be described in full.

Results: Much of the data should be given in tables and figures and these should be inserted in the text at the appropriate place. The results must be fully described in the text. It is not sufficient to merely present the tables and figures without any comment. The tables and figures should be clear without references to the text, and this requires concise explanations in legends. Where possible, data presented in the text should have already been analyzed and the complete 'raw' figures should not be included in this section but should be contained in tables in the Appendix.

Only data from the present work should be included in this section and in particular no comparison should be made at this stage with results from other workers.

Discussion: The discussion is the most difficult part of the dissertation to write because the author has to compare **critically** the present results with those of other workers and to draw valid conclusions from these studies. Descriptions of other workers findings which already appear in the Literature Review should not be repeated in the Discussion. Instead, refer to the Review.

The limitations of the study and recommendations for future research on the subject should also be included in this chapter.

As your project proceeds, keep notes of your thoughts and discussions relevant to this section.

2. References

All references should be cited in the text. The Vancouver style should be used for references, and should be listed in the order of citation. Endnote®, Reference Manager® or Mendeley® referencing software should be used for citations.

Annex 3 - Reflective training portfolio for board certification in Neuroradiology

The contents of the portfolio should encompass all of the above learning outcomes and contain evidence of achievement of these outcomes by the trainee. Although some of these may have been evaluated before the MD examination, the portfolio assessed at the PBCA should mainly contain evidence of achievements during post-MD training, either locally or overseas.

The portfolio should be reviewed at least every six months by the local supervisor(s), with regular feedback to the trainee on how the portfolio may be improved.

Contents of portfolio

1. Subject expertise
2. Teaching
3. Research and audit
4. Ethics and medico-legal issues
5. Information technology
6. Life-long learning
7. Reflective practice

a. Contents of the portfolio

The contents of the portfolio should be divided into sections according to the outcomes stated above, followed by a final section that contains evidence of reflective practice.

The following list sets out the type of evidence that may have to be included in each section.

1. Subject expertise:
    - progress reports from supervisors (essential, should be according to prescribed format)
    - Supervisor feedback on communication skills
    - log of procedures carried out
    - results of any work-place assessments conducted
    - this section must include evidence that the trainee has acquired the essential knowledge, skills and competencies related to the subspecialty of Neuroradiology identified by the BOSR, and monitored with regular assessments throughout the period of post-MD training, e.g. mini-Clinical Examinations, Case-Based Discussions, Direct Observation of Practical Skills

2. Teaching
    - undergraduates

- postgraduates
- ancillary health staff

3. Research and Audit relevant to specialty or subspecialty
    - Dissertations / theses
    - Research papers published or accepted for publication
    - abstracts of presentations
    - Clinical audit
4. Ethics and Medico-legal Issues
    - Completed Professionalism Observation Forms (from integrated learning component of Professionalism Strand)
    - Completed PTR forms during post-MD training
5. Information Technology
    - Participation in training programmes / workshops
    - Evidence of searching for information and application of findings in practice
6. Life-long learning
    - Participation in conferences and meetings
7. Reflective practice
    - narration of at least one learning event experienced by the trainee, in relation to each of the above outcomes, with reflection on what and how the trainee learned from this experience

b. Instructions to trainees

Given below is a suggested format of the portfolio. Trainees are encouraged to be innovative and creative in documenting.

1. Name of Specialist Registrar in Neuroradiology : .....
2. Date of Commencement of Training in the subspecialty : .....
3. Date of Completion of Training in the subspecialty : .....
4. Local Training :

   Training Centre/s .....

   .....

   Supervisor/s .....

   .....

   Appraisals: Were all the appraisals completed. Yes /No
   If No, details .....
5. Overseas training :

   Training Centre/s .....

   .....

   Supervisor/s .....

   .....

   Appraisals: Were all the appraisals completed. Yes /No
   If No, details .....
6. Were all the progress reports received from the local and overseas trainers? :
   Yes/ No
   If No, details .....

7. Date of Pre – Board Certification Assessment : .....
No. of attempts:

8. Date of Board Certification as a Specialist in Neuro Radiology .....

PART 1
LOG OF:

- EXAMINATIONS /PROCEDURES PERFORMED
- EDUCATIONAL COURSES/SCIENTIFIC SESSIONS ATTENDED
- ATTACHMENTS/ROTATIONS COMPLETED
- TEACHING BY TRAINEE

Please add extra pages for documentation of examinations and procedures if required

REPORTING OF PLAIN RADIOGRAPHS

Date	Skull 100	Spine 100	Other Plain Radiography and Fluroscopy	Chest Xray 200	Name of Supervisor	Signature of Supervisor
Total						

ULTRASOUND SCANNING

Date	Neonatal Brain Spine 150	Carotid and Vertebral Doppler 100	Trans Cranial Doppler 50		Name of Supervisor	Signature of Supervisor
Total						

CT SCANNING

Date	Brain 300	Head & Neck Temporal Bone,Base of Skull 200	Spine +/- Myelography and Cisternography 100	Orbits, And Sinuses 100	CT Angio,3D Imaging 200	Name of Supervisor	Signature of Supervisor
Total							

MRI SCANNING

Date	Brain 500	Spine 500	MRA/MRV Brain and MRANeck vessels 300	Newer MRI Techniques 200	Functional MRI, I00	Name of Supervisor	Signature of Supervisor
Total							

NUCLEAR MEDICINE

Date			PET - CT 100	Miscellaneous Brain, Spine	Name Supervisor	Signature of Supervisor
Total						

INTERVENTIONAL PROCEDURES
Digital Subtraction Angiography

Date	Four vessel Angiogram 50	Head and Neck Angiogram 10	Signature of Supervisor

EDUCATIONAL COURSES/SCIENTIFIC MEETING ATTENDED

Annual Academic Sessions and Clinico-radiological meetings organized by the Sri Lanka College of Radiologists can be included

Title	Date	Venue	Perceived Benefit to Trainee	Contribution to the field from the benefit gained

TEACHING BY TRAINEE
One Training Session per month

Date	Topic	Audience

ATTACHMENTS/ROTATIONS COMPLETED

Year of Training	Dates	Specialty	Hospital	Trainer's signature

PART 2
REFLECTIVE WRITING ON THE SPECIAL CASES

No. of cases to be documented - 10
Cases should be documented with available results of Plain Radiographic, Ultrasound, CT,MRI, Nuclear Medicine, Interventional procedure/s done, Surgical findings, Histopathological, Microbiological, Haematological findings and a literature survey on the Case.

Please add extra pages for documentation of cases

PART 3

AUDIT
Please use the format given under PART 4 below for documentation

PART 4

RESEARCH
Research Project Leading to a Dissertation
Audit/Research, Presentations/Publications
Two Audits or One Research, Presentations/Publications

AUDIT
Project Title
Start Date
Completion Date
Findings
Implementation of Findings (Y/N)
Re-audit(Y/N) Consultant Supervisor

RESEARCH, 'PRESENTATIONS' and/or 'PUBLICATIONS'
For presentations and publications indicate whether presented, in press or published.
Put details separately in 'PRESENTATIONS' and/or 'PUBLICATIONS' on following sheets.
Title of project
Names of Authors (underline own name)
Date study completed
Presented (Y/N)
In press (Y/N)
Published (Y/N)

PRESENTATIONS
Authors
Title

Meeting
Abstract was peer reviewed (Y/N)
Abstracts published (provide citation)

PUBLICATIONS

NB. Published *abstracts* should be placed in PRESENTATIONS section

Authors
Title
Journal
Year
Vol
Page nos.
In press (Y/N)

Appraisals

1. The trainee is recommended to take an active part with the supervisor/s in the Appraisals with regard to academic and self-improvement.
2. Number of Appraisals to be carried out: Appraisal once in every four months i.e. during local training (3) and during overseas training (3)

RATING SCALE

1 - Excellent
2 - Good pass
3 - Pass
4 - Borderline
5 - Fail

Given above is a suggested format of the portfolio. Trainees are encouraged to be innovative and creative in documenting. They must use computing and ICT skills to generate paper based entries to be included in the portfolio.

Annex 4- Peer Team Rating for assessment of registrars/ senior registrars

PTR FORM B

Confidential

Dear Colleague,

You have been your invited to participate in Peer Team Rating of this doctor. PTR is a tool for multi-source feedback 360^0 assessment. We value your independent and honest rating of our trainees.

Please indicate your profession by filling in one of the following circles

O	Consultant	O	Registrar	O	SHO or HO
O	Allied Health Professional	O	Senior Registrar	O	Nurse
O	Clerical or Secretarial Staff	O	Other specify		

Your scoring should reflect the performance of this trainee against that which you would reasonably expect at his/her stage of training and level of experience. Please feel free to add any other relevant comments about this doctor's strengths and weaknesses.

Please place form in the attached self-addressed envelope and return to the Trainer named on the envelope. DO NOT return to the trainee concerned.

THE PTR IS NOT AN ASSESSMENT OF KNOWLEDGE OR PRACTICAL SKILLS

Name of trainee: Specialty: Date:	**Strongly Agree**			**Strongly Disagree**	
	1	**2**	**3**	**4**	**5**
Attitude to staff: Respects and values contributions of other members of the team	1	2	3	4	5
Attitude to patients: Respects the rights, choices, beliefs and confidentiality of patients	1	2	3	4	5
Reliable & punctual	1	2	3	4	5
Communication skills: communicates effectively with patients and staff	1	2	3	4	5
Team player skills: Approachable, Supportive and accepts appropriate responsibility	1	2	3	4	5
Leadership skills: Takes responsibility for own actions and actions of the team	1	2	3	4	5
Honesty and Integrity: do you have any concerns?	Yes			No	
What is your overall rating of trainee's professionalism?					
Very poor				**Extremely good**	

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

Comments

Name: Signature:

Date:

Annex 5 - Progress report on for radiology trainees (Local)

Name of trainee:
Name of trainer:
Training centre:
Period of report:

Please use the following key to rate your trainee's performance during the period in question, with regard to each of the areas listed below

Excellent (5), Very good (4), Pass (3), Borderline (2), Fail (1)

PRACTICAL SKILLS	**Rating**	**Specific comments**
A. Clinical judgment		
1. Assessment of request forms		
2. Selection of appropriate radiological investigations and therapeutic procedures		
2 Preparation of patients		
3 Hands-on work in the department		
4 Interpretation of results 5 Management of complications		
6 Record keeping		

B PROJECTS OR OTHER ACTIVITIES CARRIED OUT DURING THE PERIOD OF TRAINING:

B. **INTERPERSONAL SKILLS**	**Rating**	**Specific comments**
1. Communication & working with the rest of the staff in the department.		
2. Communication & working with persons of other disciplines		
3. Supervising & helping juniors and willingness to serve when required		
4. Following instructions of senior colleagues		
5. Power of expression (oral and written)		
6. Standard of punctuality, ethics, professional attitudes and reliability		
7. Teaching medical students and juniors		

C. ACADEMIC SKILLS	Rating	Specific comments
1. Theoretical background and knowledge		
2. Reads widely in medical literature		
3. Participates actively in academic discussions		
4. Thinks independently and rationally		

Overall rating (select one): Excellent / Very Good /Pass / Borderline / Fail

General / Specific comments and action taken to improve (especially when the Grade awarded is borderline or fail):

Signature of trainer: Date

Annex 6 - Format for progress report on radiology trainees – overseas and elective appointments

NAME OF TRAINEE:
PERIOD OF TRAINING: SPECIALTY:
HOSPITAL AND UNIT: COUNTRY:
NAME OF THE CONSULTANT:

	Excellent	**Very good**	**pass**	**Borderline**	**Fail**
Theoretical knowledge					
Clinical decision making					
Clinical skills					
Operative skills					
Ability to cope with emergencies &					
complications					
Thinks independently & rationally					
Seek appropriate consultations					
Ability to follow instructions					
Quality of documentation					
Dedication to work					
Professional attitudes					
Reliability					
Availability/punctuality					
Communication skills					
Doctor-patient relationship					
Relationship with colleagues					
Relationship with other staff					
Supervises & help juniors					
Teaching of medical students/junior staff					

Overall grade (select one): Excellent / Very Good /Pass / Borderline / Fail
General / Specific comments and action taken to improve (especially when the Grade awarded is borderline or fail):

Signature of the trainer:

Date:

Annex 7 - List of books and journals for reference

Diagnostic Neuroradiology - Anne Osborn
Diagnostic imaging - Ross and More
Diagnostic imaging Pediatric Neuroradiology - A.J.Barkovich
Magnetic Resonance imaging of brain and spine Scott W Atlas
American Journal of Neuroradiology