



# Neurophysiology

Standard Operating Procedures  
For Medical Assistants in Neurophysiology

Neurophysiology

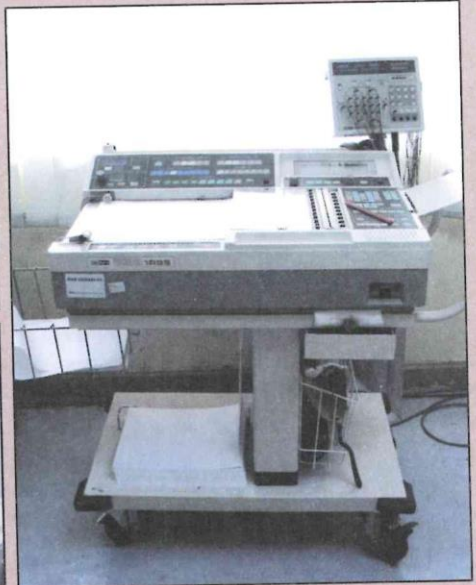
Neurophysiology

Ministry Of Health, Malaysia



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Standard Operating Procedures  
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© August 2005

ISBN 983-42618-4-5

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Published by Medical Assistants Board  
Ministry of Health Malaysia  
Level 2, Block E1, Parcel E Government Complex,  
Federal Government Administrative Centre, 62590 Putrajaya.  
Tel: 603-8883 1370 Fax: 603-8883 1490

• Printed by PERCETAKAN ZAINON KASSIM SDN. BHD., IPOH •  
No. 1 & 3, Tingkat Kilang,  
Jelapang Light Industrial Estate, 30100 Ipoh, Perak Darul Ridzuan, Malaysia.



# FOREWORD

**S**tandard Operating Procedures for Medical Assistants in the Medical Care Programme serves as a guide to meet the standards of care and professionalism set out by the Ministry of Health of Malaysia (MOH). It also serves to enhance public awareness of standards expected from Medical Assistants (MAs) who provide specialized care for patients. Public awareness of standards expected from MAs will hopefully encourage greater compliance amongst

MAs themselves to these guidelines. It is in their best interest to adhere, at all times, to the Standard Operating Procedures laid in this book.

Of late, Medical Assistants have seen many positive changes initiated by the Medical Development and Practice Divisions of MOH as well as the Medical Assistant Board with full support from all senior consultants on MOH. The MOH recognizes the valuable contributions by MAs and have created several senior posts of Medical Assistants to enhance and improve the clinical supervision and management of patients. The Ministry of Health has always stressed on the importance of effective supervision of their peers by senior Medical Assistants, under the guidance of medical officers. The preparation of the Standard Operating Procedures and other guidelines are aimed at providing useful information for quality patient care and I hope these guidelines will be used as reference material for Medical Assistants throughout the country in the execution of their duties and efforts to provide quality health care to the community.

I am confident the Standard Operating Procedures will be well accepted. We will of course ensure that updates with new topics, activities and procedures will be introduced in future editions.

May I congratulate the Medical Programme of MOH, all senior consultants and the Medical Assistants Technical Committee for their tireless efforts and commitment to publish the Standard Operating Procedures. We would also like to record our thanks to all doctors and Medical Assistants involved in the successful preparation of this first edition of the Standard Operating Procedures. I am always impressed with efforts to strive for excellence in service delivery and such efforts by the MAs are most commendable indeed.

A handwritten signature in black ink, appearing to read 'Ismail Merican', with a horizontal line underneath.

**Datuk Dr. Hj. Mohd. Ismail Merican**

Director General of Health  
Ministry of Health, Malaysia  
July 2005



# FOREWORD

Successive generations of Medical Assistants who have worked in the Ministry of Health have all practiced the long-held tradition of hands-on training to ensure that everyone can acquire the latest knowledge and skills. While formal training has always been encouraged this is not always possible for some for various reasons. To their credit this form of knowledge and skill sharing has been done rather effectively. While practicing the skill which they acquired through training never posed any problem, the lack of documents which specify standard methods of carrying various tasks has been a cause of anxiety and concern to many. Thus the arrival of this document on the standard operating procedures for Neurophysiology into the scene now should alleviate the anxiety of many.

The importance and relevance of this SOP Standard Operating Procedures for Neurophysiology, which is long overdue, can never be overstated. This SOP will ensure uniformity/standardization, correctness/accuracy, effectiveness as well consistency in performance. Not all tasks require SOP as they are carried out routinely. SOPs can be considered as mandatory for tasks which are complicated. Tasks and procedures associated with the four above mentioned disciplines are certainly complicated.

SOP can easily be “linked” to quality assurance. Compliance to SOP would certainly ensure quality care for the patient. This is important as our patients now are increasingly well informed of their rights and they expect nothing less than the quality of care that they perceive they deserve. This SOP will not only be useful to those who are already familiar with the procedures but staff who are fairly new will find it very useful.

Writing this SOP, I am sure, has not been an easy task. It requires an certain depth of knowledge, team approach and the courage to decide on what should constitute standard methods. To the authors of this SOP we owe them deep gratitude for their effort, time and resilience. They must be congratulated for a job well done.

Thank you

A handwritten signature in black ink, consisting of stylized, overlapping loops and a long horizontal stroke extending to the right.

**Datuk Dr. Abdul Gani bin Mohammed Din**  
Deputy Director General of Health (Medical)  
Ministry of Health



# M E S S A G E

It gives me a great pleasure to write this message in the compilation of SOP (Standard Operating Procedure) for various tests in neurophysiology. This is the first ever assemblage done for the Ministry of Health Malaysia.

Neurophysiological testing is one of the important diagnostic studies in the wide range of neurological diseases. The SOP will ensure standardised techniques, accurate results and hence the interpretation derived from such procedures. This is crucially important for further management of the patients.

Finally, I would like to express my sincere appreciation and gratitude to all Medical Assistants involved in the dynamic discussions, ideas and reference in preparing of this work manual.

A handwritten signature in black ink, consisting of stylized, overlapping letters and a horizontal line at the bottom.

**Dato' Dr. Md. Hanip bin Rafia, DPMJ., SAP.**  
Chairman Of Technical Committee  
Senior Consultant Neurologist & Head Of Department  
Neurology Department  
Hospital Kuala Lumpur

## TECHNICAL COMMITTEE

---

- ADVISOR** : **YBhg. Dato' Dr. Md. Hanip bin Rafia**, DPMJ., SAP.  
Senior Consultant Neurologist & Head of Department  
Neurology Department  
Kuala Lumpur Hospital
- CHAIRMAN** : **Mr. Hj. Hassan bin Hj. Ahmad**, AMN., PIS.  
Chief Medical Assistant Malaysia  
Ministry of Health Malaysia
- SECRETARY** : **Mr. Nurul Asri bin Haji Zainuddin**, PPT.  
Senior Medical Assistant  
Head Of Neurophysiology Unit  
Kuala Lumpur Hospital
- MEMBER** : **Mr. Ahmad Nasir bin Ismail**  
Senior Medical Assistant  
Pulau Pinang Hospital
- Mr. Johar bin Ithnin**  
Senior Medical Assistant  
Sultanah Aminah Hospital, Johor Bahru
- Mr. Mohd Nazli bin Mohammed Khalid**  
Senior Medical Assistant  
Sungai Buloh Hospital
- Mr. Mohd. Shakir bin Haji Saad**  
Medical Assistant  
Kuala Lumpur Hospital
- Mr. Rosdi bin Zainol**  
Medical Assistant  
Kuala Lumpur Hospital
- Mr. Zaidi bin Abd. Hamid**  
Medical Assistant  
Kuala Lumpur Hospital

**Mr. Abdul Majid bin Md. Noh**

Medical Assistant

Tengku Ampuan Rahimah Hospital, Klang

**Mr. Ngalih Anak Tingi**

Medical Assistant

Sarawak General Hospital, Kuching

**Mr. Calvein Ng Siew Yun**

Medical Assistant

Queen Elizabeth Hospital, Kota Kinabalu

**Mr. Mohd. Isa bin Mijan**

Medical Assistant

Malacca Hospital

**Mr. Nazurudin bin Mohd Ariff**

Medical Assistant

Paediatric Institute

Kuala Lumpur Hospital



## LIST OF CONTRIBUTORS

---

**Mr. Zamri bin Ali**

Medical Assistant  
Kuala Lumpur Hospital

**Mr. Wan Mohd Afendi bin****Wan Mahadi**

Medical Assistant  
Kuala Lumpur Hospital

**Mr. Zulkifli bin Abdul Salam**

Medical Assistant  
Kuala Lumpur Hospital

**Mr. Samad bin Alias**

Medical Assistant  
Sultanah Aminah Hospital  
Johor Bahru

**Mr. Hairuddin bin Sharuddin**

Medical Assistant  
Seremban Hospital

**Mr. Mohd. Yusof bin Taib**

Medical Assistant  
Tawau Hospital

**Mr. Zaharuddin bin Abd. Rahim**

Medical Assistant  
Tengku Ampuan Afzan Hospital  
Kuantan

**Mr. Zamzuki bin Mat Zali**

Medical Assistant  
Kota Bharu Hospital

**Mr. Ahmad Syamsul bin Rezali**

Medical Assistant  
Tengku Ampuan Rahimah Hospital  
Klang

**Mr. Nor Syaharir Badli bin Mohamad**

Medical Assistant  
Kuala Terengganu Hospital

**Mr. Mohd. Adly bin Che Dah**

Medical Assistant  
Pulau Pinang Hospital

**Mr. Zaizali bin Zainal Abidin**

Medical Assistant  
Ipoh Hospital

**Mr. Mohd Zulkifli bin Alias**

Medical Assistant  
Paediatric Institute  
Kuala Lumpur Hospital

**Mr. Ruzlan bin Yusof**

Medical Assistant  
Seremban Hospital

## LIST OF REVIEWERS

---

1. **YBhg. Dato' Dr. Md. Hanip bin Rafia, DPMJ., SAP.**  
Senior Consultant Neurologist & Head Of Department  
Neurology Department  
Kuala Lumpur Hospital
  
2. **Dr. Zariah bt Abdul Aziz**  
Consultant Neurologist  
Medical Department  
Kuala Terengganu Hospital
  
3. **Dr. Santhi Datuk Puvanarajah**  
Consultant Neurologist  
Neurology Department  
Kuala Lumpur Hospital
  
4. **Dr. Chris Chong Kang Tird**  
Consultant Neurologist  
Medical Department  
Queen Elizabeth Hospital, Kota Kinabalu
  
5. **Dr. Sathindren Santhirathelagan**  
Consultant Neurologist  
Medical Department  
Pulau Pinang Hospital

## THE EVOLVING OF MEDICAL ASSISTANTS

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The Medical Assistants evolved from “Dresser” during the Pre war times in then Malaya. Later the name was changed to Hospital Assistants in 1970 and in 1985, the name has designated as Medical Assistants. The leading roles and responsibilities of Medical Assistants can be considered as the backbone of the rural Government curative and preventive component of the health care services.

Their services were comparable as those of physician’s assistant in the United States, nurse practitioner in Europe, the “Bare-foot Doctor” in China and then in Soviet Union the “Feldsher”. Medical Assistants elsewhere perform the many tasks of physician. They were the main health care personnel which represent an alternative to physician centred health care both in outpatient and inpatient service.

The training of the dresser was conducted with lectures and supervised in his practical work through his routine duties from seasoned medical graduates.

After passing the Probationer to Grade III Examination, at the end of two years, these dressers were assigned to work as junior members of a team of more senior dressers in carrying out their professional duties. At the end of his four years, after passing the examination, he had to sit for his Grade III to Grade II Examination.

A Dresser with Grade II rank and status was then considered as “sufficiently competent” and experienced to handle surgical and medical problems in hospital.

He is competent to handle any emergencies and has practical experience in Midwifery. Dresser Grade II to Grade I, considered prestigious, were for the Senior Grade Dresser. The subjects were Medicine, Surgery, Materia Medica, Preventive Medicines and Midwifery.

In early Malaya, and now Malaysia, Dressers have been called different names. They were referred to as Apothecaries, Sub-Assistant Surgeon, Surgical Assistant, Hospital Assistants and now Medical Assistants.

Towards 1965, Crash-Program was started by recruiting youths of the Straits that had completed their School Certificate level examination to the Crash-Program to overcome the acute shortage of trained medical personnel.

In January 1971, the first Hospital Assistants School in Seremban commenced its training solely for Hospital Assistants in the country. Today Malaysia has four Medical Assistants colleges (Seremban, Alor Setar, Ipoh and Kuching). The curriculums are structured specifically to enable the Hospital Assistants to function in various

health settings with emphasis on the health promotions, prevention, rehabilitation, curative and health management skill. Candidates who passed their Sijil Pelajaran Malaysia, successfully gone through interview conducted by Public Service Commission are accepted into the three years Medical Assistants training programme.

Upon completion and having passed the final examination, they will be registered by the Medical Assistant Board and then be appointed by the Public Service Commission (Government) before they are posted to the various health care services in Malaysia. Those sponsored by respective agencies private entities will serve their employer.

The Act 180 of Hospital Assistants Act 1977 allows the establishment of Hospital Assistants (Registration) Board which supercede all matters related to the regulations and registration of Medical Assistants.

In 1993, the Medical Act 1971, Medical (Instrumental)(Exemption) Regulations 1986 was recommended for Enhancement to allow the Medical Assistants to use list of medical instruments such as stethoscope, laryngoscope, sphygmomanometer in the course of his duties.

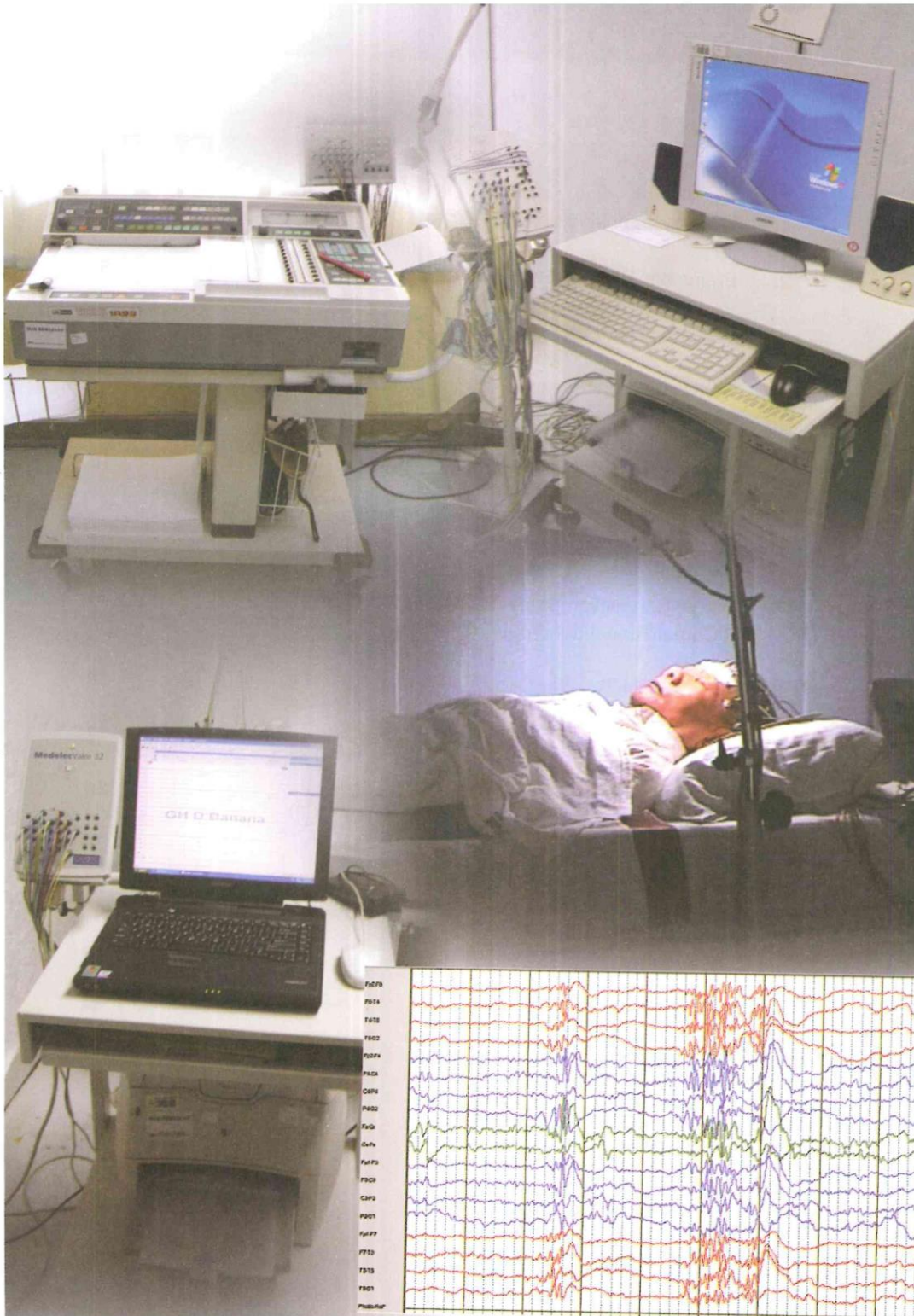
In 1992, the Certificate level was upgraded to a Diploma level due to the various new development and challenges in the health care demanding for a highly skilled and knowledge based health care profession.

Today, in an era of specialization, rapid technology and medical science development, the Medical Assistants role as complement and supplement are evolving with times so as to remain relevant, clients focus in this ever-fast changing health care scenario.



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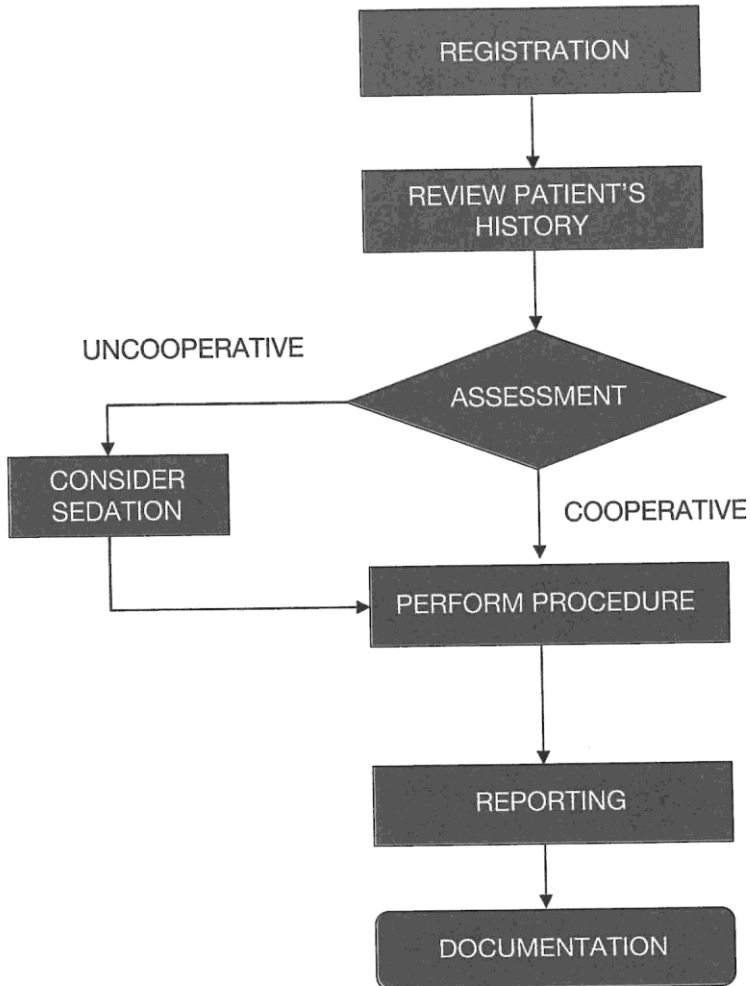
## 1. ELECTROENCEPHALOGRAPHY ( EEG )

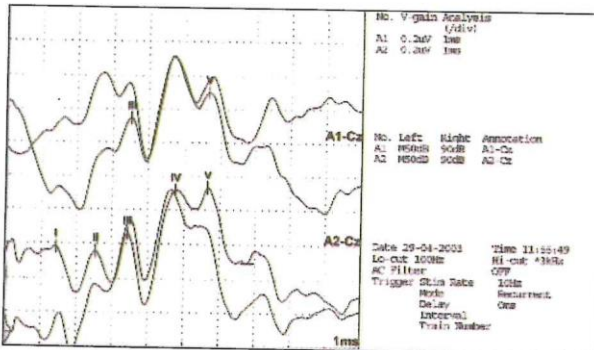
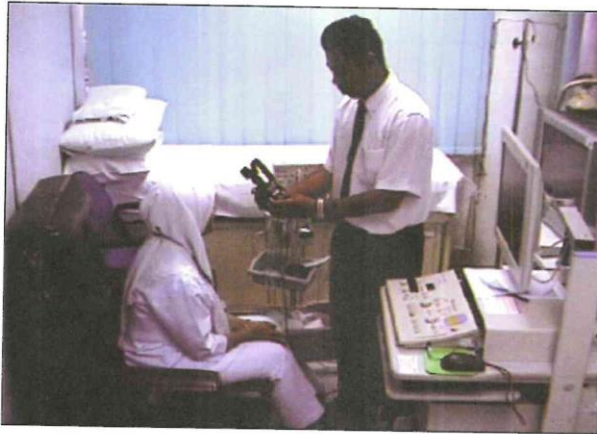
Activity	Work Process	Standard	Requirement
1. Registration	All patients should be registered in the standard registration book after receiving request form.	<ol style="list-style-type: none"> <li>1. Name</li> <li>2. I/C No.</li> <li>3. Age</li> <li>4. Sex</li> <li>5. R/N</li> <li>6. Race</li> <li>7. Address</li> <li>8. Diagnosis</li> </ol>	<b>Equipment:</b> <ol style="list-style-type: none"> <li>1. EEG Machine</li> <li>2. EEG Electrodes</li> <li>3. Measuring tape</li> <li>4. Dermatograph pencil</li> <li>5. Skin conditioner</li> <li>6. Gauze/Cotton</li> <li>7. Micropore</li> <li>8. Collodion / EEG Paste</li> <li>9. Airgun/Dryer</li> </ol>
2. Review patient's history	<ol style="list-style-type: none"> <li>1. Date of onset</li> <li>2. Last attack</li> <li>3. Family history</li> <li>4. Medical history</li> <li>5. Medication</li> </ol>		
3. Assessment	<ol style="list-style-type: none"> <li>1. General condition</li> <li>2. Cooperative /Uncooperative</li> </ol>		<b>Drug : (Sedative)</b> <ol style="list-style-type: none"> <li>1. Dormicum (IM / IV)</li> <li>2. Valium(Rectal/ IM/IV)</li> <li>3. Syrup Chloral Hydrate</li> </ol>
4. Recording procedure	<ol style="list-style-type: none"> <li>1. Explain the procedure</li> <li>2. Position and make the patient comfortable</li> <li>3. Measure, mark and attach electrodes correctly and securely</li> <li>4. Calibration</li> </ol>	Montreal System <ol style="list-style-type: none"> <li>1. Sensitivity 100 <math>\mu</math>V</li> <li>2. HFF 70 Hz</li> <li>3. LFF 0.5 Hz</li> <li>4. Time base 30 mm/sec</li> <li>5. 10mm deflection at 100 <math>\mu</math>V sensitivity</li> </ol>	



Activity	Work Process	Standard	Requirement
	5. Impedance check 6. Identify and eliminate or minimize biological and physical artifacts 7. Record with appropriate montages 8. Annotation of events 9. Activation procedures 9.1 Eye open and eye close 9.2 Hyperventilation (HV) 9.3 Photic stimulation 10. Calibration	< 5 K $\Omega$  Monopolar and Bipolar minimum 20 minutes  3 minutes HV and 2 minutes post HV  1 to 30 flashes per sec  1. Sensitivity 100 $\mu$ V 2. HFF 70 Hz 3. LFF 0.5 Hz 4. Time base 30 mm/sec 5. 10mm deflection at 100 $\mu$ V sensitivity	
5. Reporting	1. Prepare factual report 2. Compile and send record for reporting		
6. Documentation and dispatching of report	1. Record and dispatch 2. File report		

## FLOW CHART ELECTROENCEPHALOGRAPHY ( EEG )





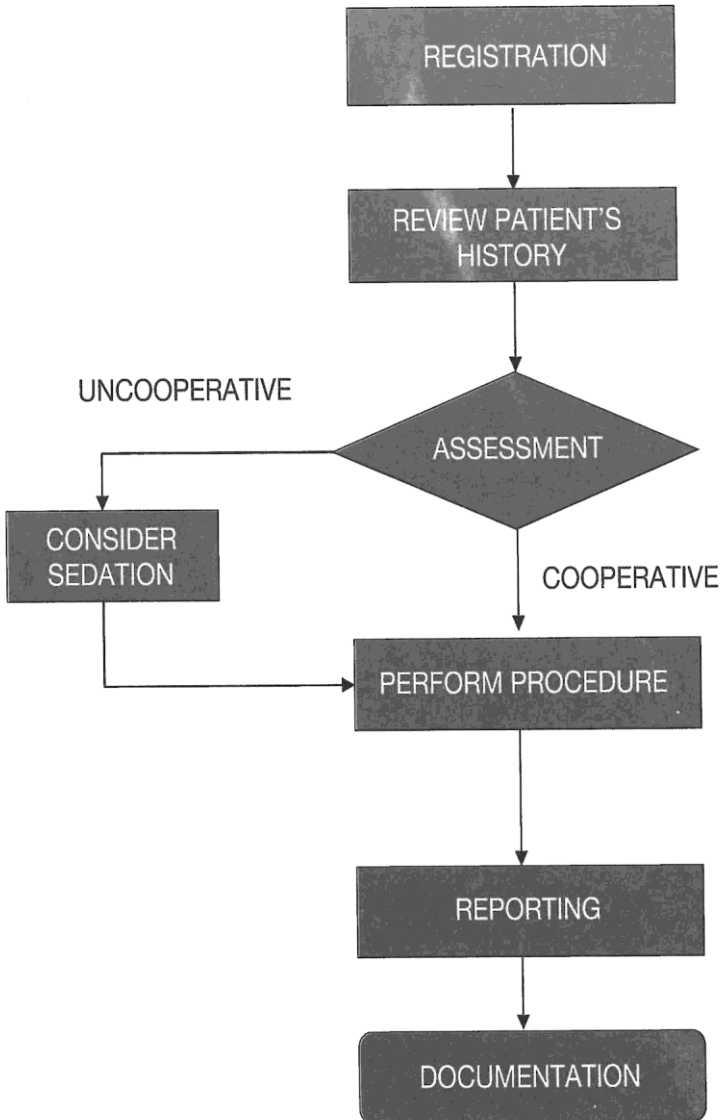
## 2. BRAINSTEM AUDITORY EVOKED POTENTIAL (BAEP)

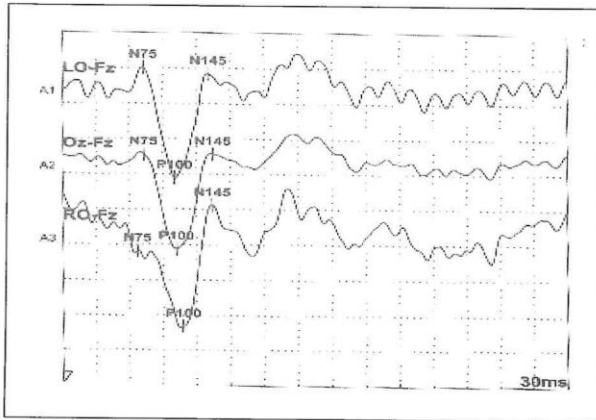
Activity	Work Process	Standard	Requirement
1. Registration	All patients should be registered in the standard registration book after receiving request form.	<ol style="list-style-type: none"> <li>1. Name</li> <li>2. I/C No.</li> <li>3. Age</li> <li>4. Sex</li> <li>5. R/N</li> <li>6. Race</li> <li>7. Address</li> <li>8. Diagnosis</li> </ol>	<p><b>Equipment:</b></p> <ol style="list-style-type: none"> <li>1. Evoked Potential Machine</li> <li>2. EEG Electrode</li> <li>3. Measuring tape</li> <li>4. Dermatograph pencil</li> <li>5. Skin conditioner</li> <li>6. EEG Paste</li> <li>7. Gauze/Cotton</li> <li>8. Micropore</li> </ol> <p><b>Drug : (Sedative)</b></p> <ol style="list-style-type: none"> <li>1. Dormicum (IM / IV)</li> <li>2. Valium(Rectal/ IM/IV)</li> <li>3. Syrup Chloral Hydrate</li> </ol>
2. Review patient's history	<ol style="list-style-type: none"> <li>1. Date of onset</li> <li>2. Medical history</li> <li>3. Family history</li> <li>4. Medication</li> </ol>		
3. Assessment	<ol style="list-style-type: none"> <li>1. General condition</li> <li>2. Cooperative /Uncooperative</li> </ol>		
4. Recording procedure	<ol style="list-style-type: none"> <li>1. Explain the procedure</li> <li>2. Position and make the patient comfortable</li> <li>3. Measure, mark and attach electrodes correctly and securely</li> <li>4. Calibration</li> <li>5. Impedance check</li> <li>6. Identify and eliminate or minimize biological and physical artifacts</li> </ol>	<p>Montreal System</p> <ol style="list-style-type: none"> <li>1. Flat baseline</li> <li>2. Sensitivity 20 <math>\mu</math>V</li> <li>3. HFF 100 Hz</li> <li>4. LFF 1 Hz</li> </ol> <p>&lt; 5 K<math>\Omega</math></p>	

Activity	Work Process	Standard	Requirement
	<ol style="list-style-type: none"><li>7. Start recording with appropriate montage</li><li>8. Start stimulation at 50 dB above hearing threshold</li></ol>	Check hearing threshold  Minimum two identical responses required for each ear	
5. Reporting	<ol style="list-style-type: none"><li>1. Compile</li><li>2. Send record for reporting</li></ol>		
6. Documentation and dispatching of report	<ol style="list-style-type: none"><li>1. Record and dispatch</li><li>2. File report</li></ol>		

## FLOW CHART BRAINSTEM AUDITORY EVOKED POTENTIAL (BAEP)

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### 3. VISUAL EVOKED POTENTIAL (VEP)

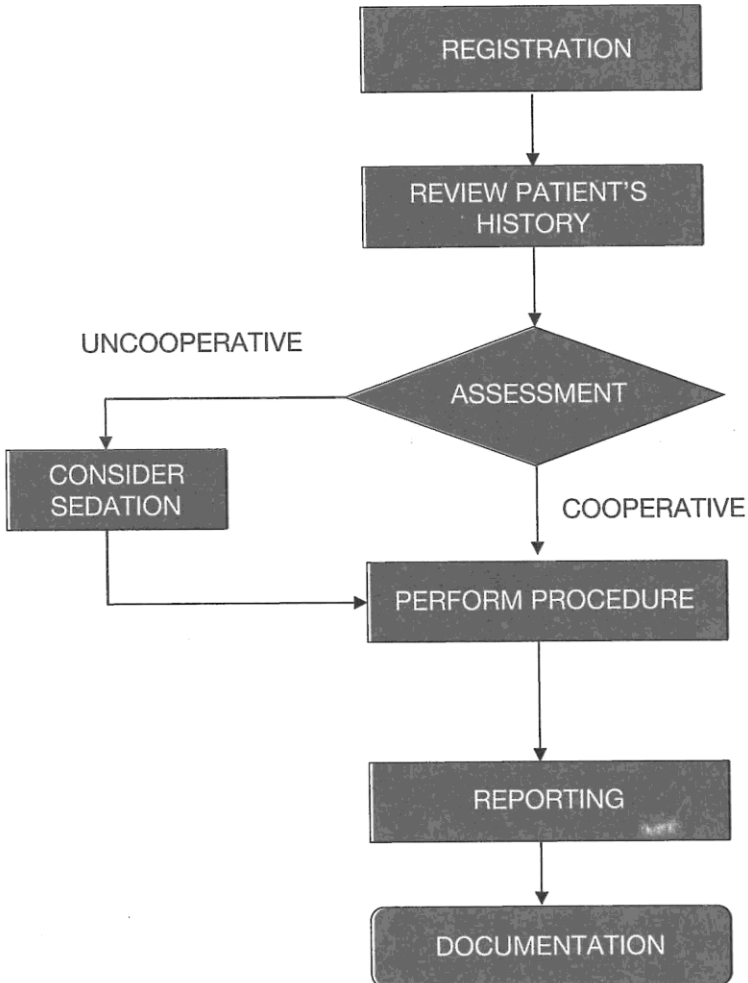
Activity	Work Process	Standard	Requirement
1. Registration	All patients should be registered in the standard registration book after receiving request form	<ol style="list-style-type: none"> <li>1. Name</li> <li>2. I/C No.</li> <li>3. Age</li> <li>4. Sex</li> <li>5. R/N</li> <li>6. Race</li> <li>7. Address</li> <li>8. Diagnosis</li> </ol>	<p><b>Equipment:</b></p> <ol style="list-style-type: none"> <li>1. Evoked Potential Machine</li> <li>2. EEG Electrodes</li> <li>3. Measuring tape</li> <li>4. Dermatograph pencil</li> <li>5. Skin conditioner</li> <li>6. EEG Paste</li> <li>7. Gauze/Cotton</li> <li>8. Micropore</li> <li>9. Eye pad</li> <li>10. Schnellen's Chart</li> </ol> <p><b>Drug : (Sedative)</b></p> <ol style="list-style-type: none"> <li>1. Dormicum (IM / IV)</li> <li>2. Valium (Rectal /IM/IV)</li> <li>3. Syrup</li> </ol>
2. Review patient's history	<ol style="list-style-type: none"> <li>1. Date of onset</li> <li>2. Medical history</li> <li>3. Family history</li> <li>4. Medication</li> </ol>		
3. Assessment	<ol style="list-style-type: none"> <li>1. General condition</li> <li>2. Cooperative /Uncooperative</li> </ol>		
4. Recording procedure	<ol style="list-style-type: none"> <li>1. Explain the procedure</li> <li>2. Position and make the patient comfortable</li> <li>3. Visual acuity check</li> <li>4. Measure, mark and attach electrodes correctly and securely</li> <li>5. Calibration</li> </ol>	<p>Montreal System</p> <ol style="list-style-type: none"> <li>1. Flat baseline</li> <li>2. Sensitivity 20 <math>\mu</math>V</li> <li>3. HFF 100 Hz</li> <li>4. LFF 1 Hz</li> </ol>	

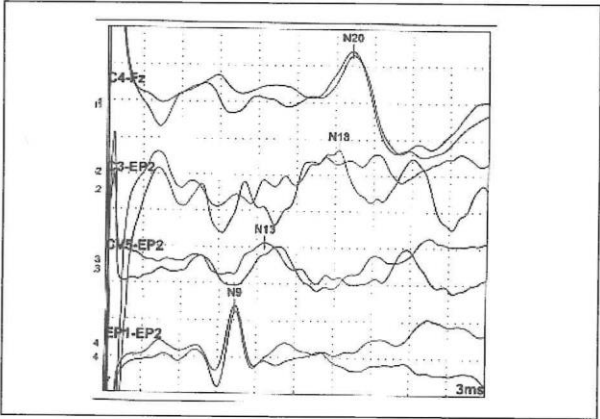


Activity	Work Process	Standard	Requirement
	6. Impedance Check  7. Identify and eliminate or minimize biological and physical artifacts  8. Start stimulating and recording with appropriate montage	< 5 K $\Omega$   Minimum two identical responses required for each eye	
5. Reporting	1. Compile 2. Send record for reporting		
6. Documentation and dispatching of report	1. Record and dispatch 2. File report		

## FLOW CHART VISUAL EVOKED POTENTIAL (VEP)

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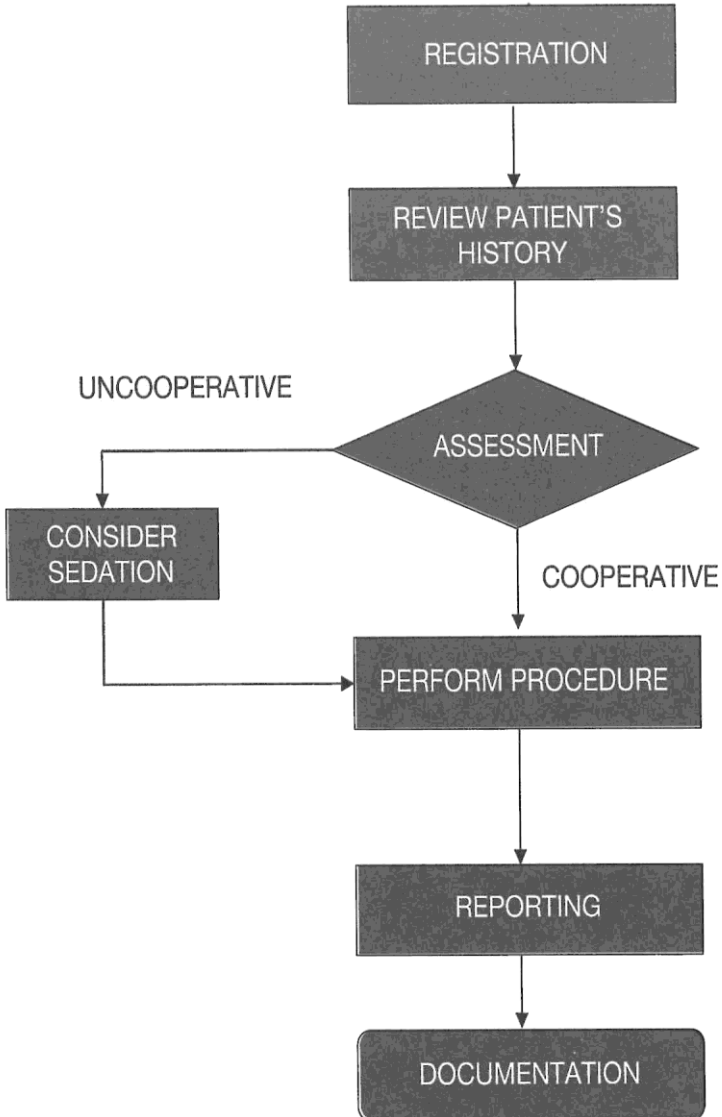
#### 4. SOMATOSENSORY EVOKED POTENTIAL (SSEP) - MEDIAN NERVE

Activity	Work Process	Standard	Requirement
1. Registration	All patients should be registered in the standard registration book after receiving request form	<ol style="list-style-type: none"> <li>1. Name</li> <li>2. I/C No.</li> <li>3. Age</li> <li>4. Sex</li> <li>5. R/N</li> <li>6. Race</li> <li>7. Diagnosis</li> </ol>	<b>Equipment:</b> <ol style="list-style-type: none"> <li>1. Evoked Potential Machine</li> <li>2. EEG Electrodes</li> <li>3. Measuring tape</li> </ol>
2. Review patient's history	<ol style="list-style-type: none"> <li>1. History of onset</li> <li>2. Medication</li> <li>3. Family history</li> <li>4. Medical history</li> </ol>		<ol style="list-style-type: none"> <li>4. Dermatograph pencil</li> <li>5. Skin conditioner</li> <li>6. EEG Paste</li> <li>7. Gauze/Cotton</li> <li>8. Micropore</li> </ol>
3. Assessment	<ol style="list-style-type: none"> <li>1. General condition</li> <li>2. Cooperative /Uncooperative</li> </ol>		<b>Drug : (Sedative)</b> <ol style="list-style-type: none"> <li>1. Dormicum (IM/IV)</li> <li>2. Valium (Rectal /IM/IV)</li> <li>3. Syrup Chloral Hydrate</li> </ol>
4. Recording procedure	<ol style="list-style-type: none"> <li>1. Explain the procedure</li> <li>2. Position and make the patient comfortable</li> <li>3. Measure, mark and attach electrodes correctly and securely</li> <li>4. Calibration</li> <li>5. Impedance Check</li> </ol>	<p>Montreal System</p> <ol style="list-style-type: none"> <li>1. Flat baseline</li> <li>2. Sensitivity 20 <math>\mu</math>V</li> <li>3. HFF 100 Hz</li> <li>4. LFF 1 Hz</li> </ol> <p>&lt; 5 K<math>\Omega</math></p>	

Activity	Work Process	Standard	Requirement
	<ol style="list-style-type: none"> <li>6. Identify and eliminate or minimize biological and physical artifacts</li> <li>7. Start recording by stimulating Median Nerve at the wrist</li> </ol>	Minimum two identical responses required	
5. Reporting	<ol style="list-style-type: none"> <li>1. Compile</li> <li>2. Send record for reporting</li> </ol>		
6. Documentation and dispatching of report	<ol style="list-style-type: none"> <li>1. Record and dispatch</li> <li>2. File report</li> </ol>		

## FLOW CHART SOMATOSENSORY EVOKED POTENTIAL (SSEP) - MEDIAN NERVE

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## 5. SOMATOSENSORY EVOKED POTENTIAL (SSEP) - POSTERIOR TIBIAL NERVE

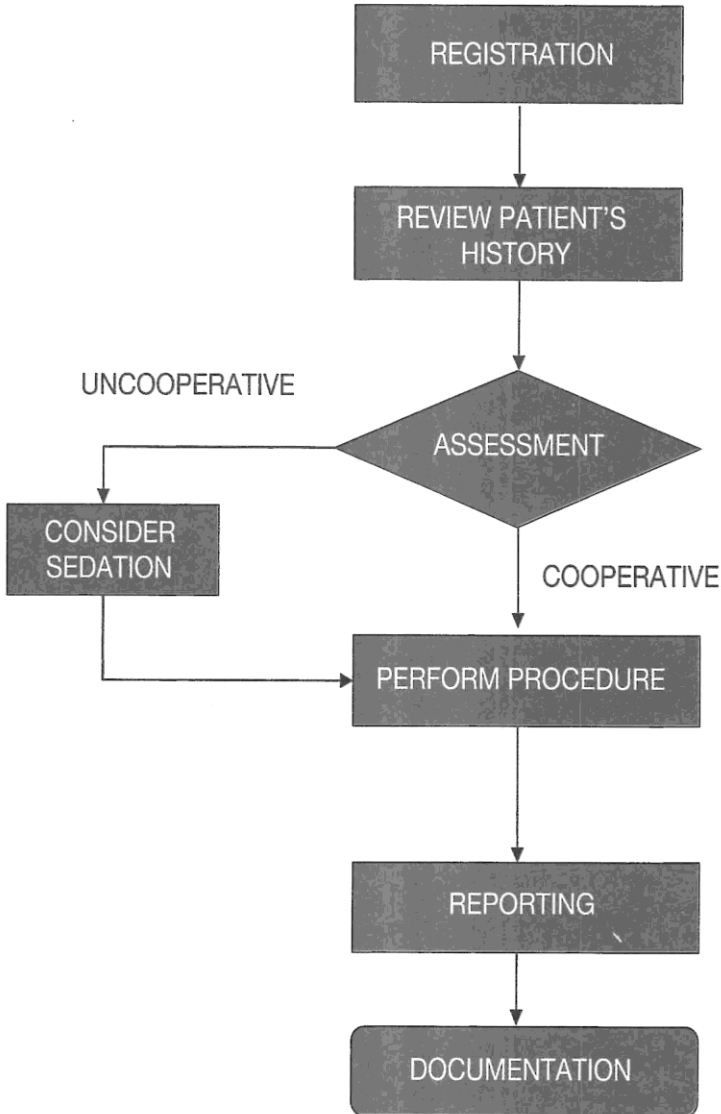
Activity	Work Process	Standard	Requirement
1. Registration	All patients should be registered in the standard registration book after receiving request form	1. Name 2. I/C No. 3. Age 4. Sex 5. R/N 6. Race 7. Diagnosis	<b>Equipment:</b> 1. Evoked Potential Machine 2. EEG Electrodes 3. Measuring tape 4. Dermatograph pencil 5. Skin conditioner 6. EEG Paste 7. Gauze/Cotton 8. Micropore
2. Review patient's history	1. History of onset 2. Medication 3. Family history 4. Medical history		<b>Drug : ( Sedative)</b> 1. Dormicum (IM / IV) 2. Valium (Rectal/IM/IV) 3. Syrup Chloral Hydrate
3. Assessment	1. General condition 2. Cooperative /Uncooperative		<b>Drug : ( Sedative)</b> 1. Dormicum (IM / IV) 2. Valium (Rectal/IM/IV) 3. Syrup Chloral Hydrate
4. Recording procedure	1. Explain the procedure 2. Position and make the patient comfortable 3. Mark and attach electrodes correctly and securely 4. Calibration 5. Check Impedance 6. Identify and eliminate or minimize biological and physical artifacts	Montreal System 1. Flat baseline 2. Sensitivity 20 $\mu$ V 3. HFF 100 Hz 4. LFF 1 Hz < 5 K $\Omega$	

Activity	Work Process	Standard	Requirement
	7. Start recording by stimulating Posterior Tibial Nerve at the ankle	Minimum two identical responses required	
5. Reporting	1. Compile 2. Send record for reporting		
6. Documentation and dispatching of report	1. Record and dispatch 2. File report		



## FLOW CHART SOMATOSENSORY EVOKED POTENTIAL (SSEP) - POSTERIOR TIBIAL NERVE

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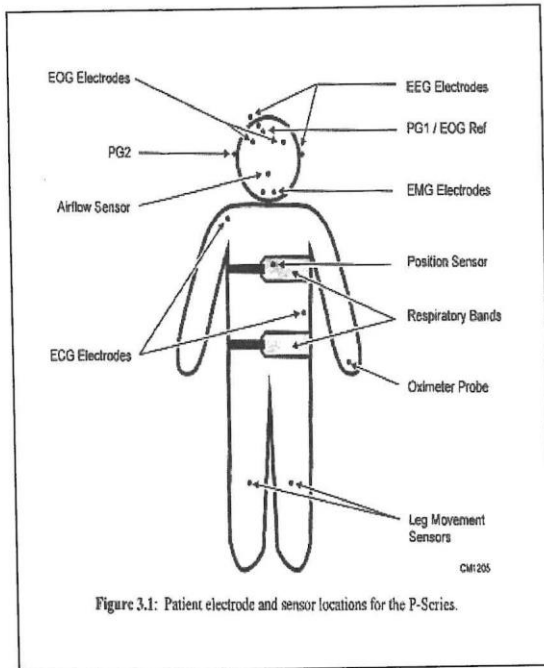


Figure 3.1: Patient electrode and sensor locations for the P-Series.



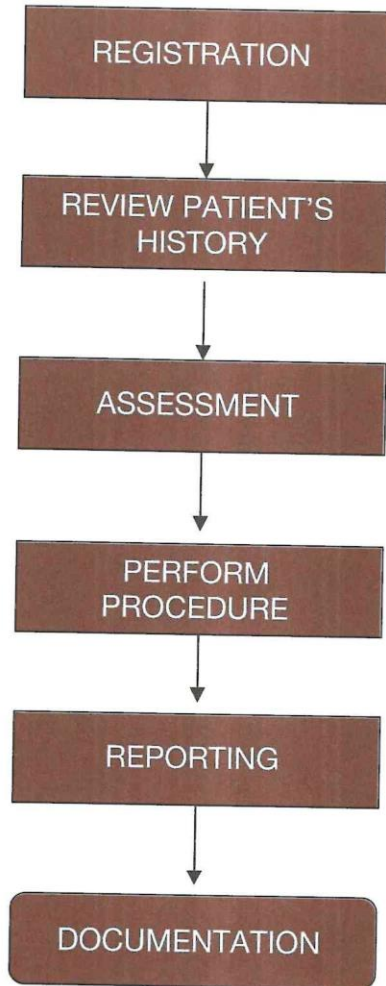
## 6. POLYSOMNOGRAPHY (PSG)

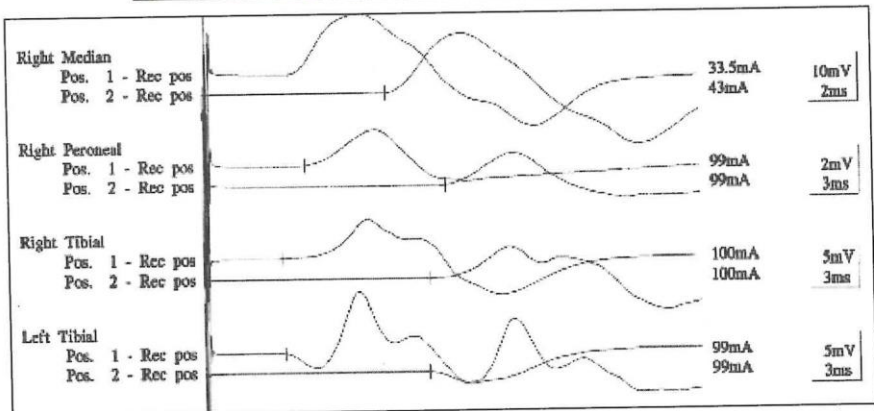
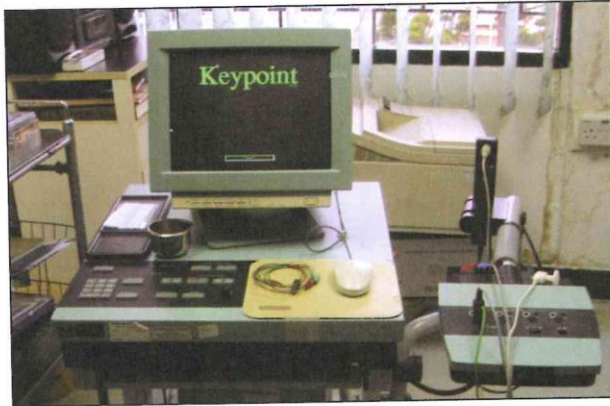
Activity	Work Process	Standard	Requirement
1. Registration	All patients should be registered in the standard registration book after receiving request form	<ol style="list-style-type: none"> <li>1. Name</li> <li>2. I/C No.</li> <li>3. Age</li> <li>4. Sex</li> <li>5. R/N</li> <li>6. Race</li> <li>7. Diagnosis</li> </ol>	<b>Equipment:</b> <ol style="list-style-type: none"> <li>1. PSG Machine</li> <li>2. EEG Electrodes</li> <li>3. Measuring tape</li> <li>4. Dermatograph pencil</li> <li>5. Skin conditioner</li> <li>6. Gauze/Cotton</li> <li>7. Micropore</li> <li>8. Collodion / EEG Paste</li> <li>9. Airgun/Dryer</li> </ol>
2. Review patient's history	<ol style="list-style-type: none"> <li>1. History of sleep interference</li> <li>2. Medication</li> <li>3. Family history</li> <li>4. Medical history</li> </ol>		
3. Assessment	<ol style="list-style-type: none"> <li>1. General condition</li> <li>2. Cooperative /Uncooperative</li> </ol>		
4. Recording Procedure	<ol style="list-style-type: none"> <li>1. Explain the procedure</li> <li>2. Position and make the patient comfortable</li> <li>3. Measure, mark and attach electrodes correctly and securely</li> <li>4. Fix other require gadgets</li> <li>5. Calibration</li> <li>6. Impedance Check</li> </ol>	<p>Montreal System</p> <ol style="list-style-type: none"> <li>1. Sensitivity 100 <math>\mu</math>V</li> <li>2. HFF 70 Hz</li> <li>3. LFF 0.5 Hz</li> <li>4. Time base 30 mm/sec</li> <li>5. 10mm deflection at 100 <math>\mu</math>V sensitivity</li> <li>6. Saturation calibration</li> </ol> <p>&lt; 5 K<math>\Omega</math></p>	

Activity	Work Process	Standard	Requirement
	7. Identify and eliminate or minimize biological and physical artifacts 8. Record 9. Annotation of events 10. Calibration	Minimum 6 hours  1. Sensitivity 100 $\mu$ V 2. HFF 70 Hz 3. LFF 0.5 Hz 4. Time base 30 mm/sec 5. 10mm deflection at 100 $\mu$ V sensitivity 6. Saturation calibration	
5. Reporting	1. Prepare factual report 2. Compile and send record for reporting		
6. Documentation and dispatching of report	1. Record and dispatch 2. File report		

## FLOW CHART POLYSOMNOGRAPHY (PSG)

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## 7. NERVE CONDUCTION STUDY (NCS) - CARPAL TUNNEL SYNDROME

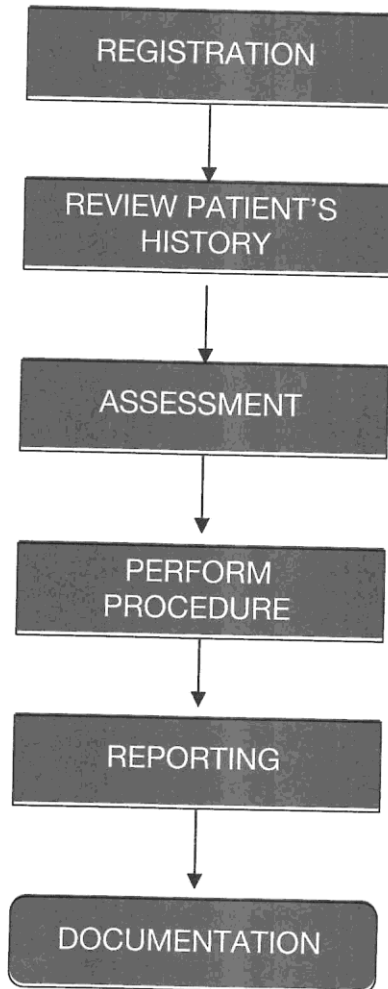
Activity	Work Process	Standard	Requirement
1. Registration	All patients should be registered in the standard registration book after receiving request form	<ol style="list-style-type: none"> <li>1. Name</li> <li>2. I/C No.</li> <li>3. Age</li> <li>4. Sex</li> <li>5. R/N</li> <li>6. Race</li> <li>7. Diagnosis</li> </ol>	<b>Equipment:</b> <ol style="list-style-type: none"> <li>1. NCS Machine</li> <li>2. Measuring tape</li> <li>3. Skin conditioner/ Methylated Spirit</li> <li>4. Conduction paste</li> <li>5. Gauze/Cotton</li> <li>6. Normal saline</li> <li>7. NCS Electrodes</li> <li>8. Dermatograph pencil</li> </ol>
2. Review history patient's	<ol style="list-style-type: none"> <li>1. History of illness</li> <li>2. Medical history</li> </ol>		
3. Assessment	<ol style="list-style-type: none"> <li>1. General condition</li> </ol>		
4. Recording procedure	<ol style="list-style-type: none"> <li>1. Explain the procedure</li> <li>2. Position and make the patient comfortable</li> <li>3. Calibration</li> <li>4. Identify and eliminate or minimize biological and physical artifacts</li> <li>5. Attach electrode correctly and securely</li> <li>6. Stimulate Median and Ulnar nerve</li> <li>7. Measure the distance between stimulating and recording point</li> </ol>	<ol style="list-style-type: none"> <li>1. Sensitivity 20 <math>\mu</math>V</li> <li>2. Duration 0.1 m/sec</li> <li>3. Time base 2 m/sec</li> </ol> <p>Motor and sensory</p>	

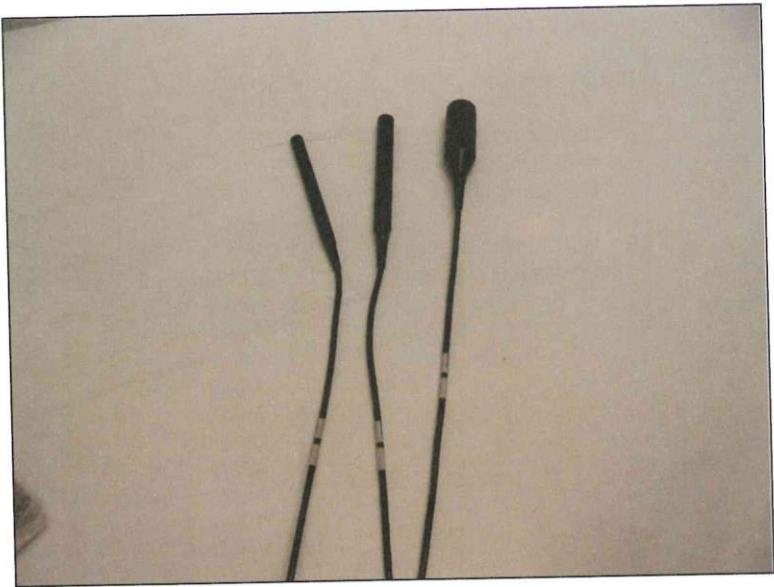
Activity	Work Process	Standard	Requirement
5. Reporting	Compile and send record for reporting		
6. Documentation and dispatching of report	1. Record and dispatch 2. File report		



## FLOW CHART NERVE CONDUCTION STUDY (NCS) - CARPAL TUNNEL SYNDROME

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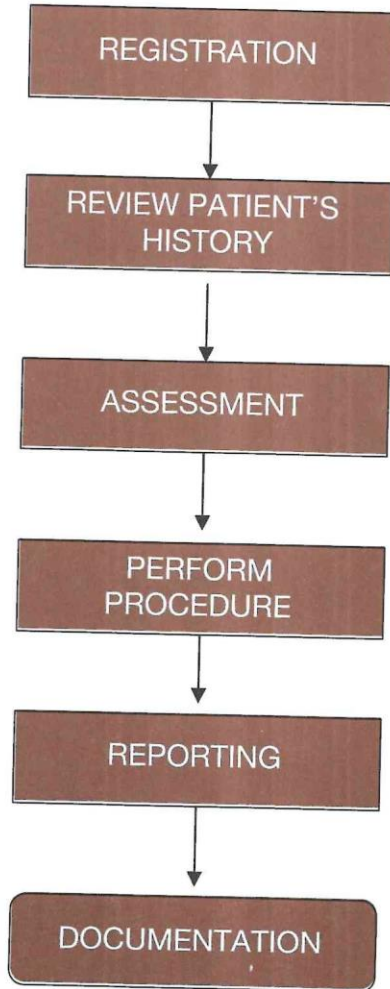
## 8. TRANSCRANIAL DOPPLER (TCD)

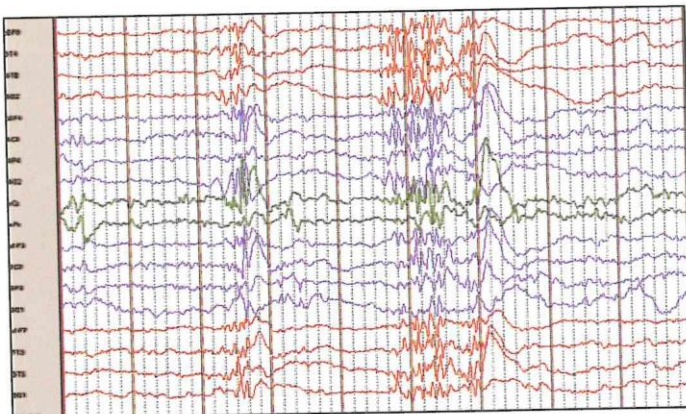
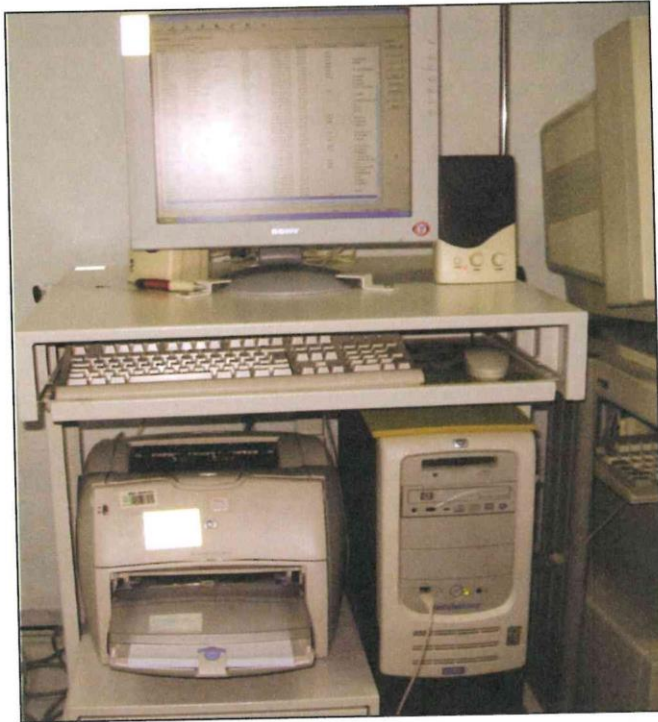
Activity	Work Process	Standard	Requirement
1. Registration	All patients should be registered in the standard registration book after receiving request form	<ol style="list-style-type: none"> <li>1. Name</li> <li>2. I/C No.</li> <li>3. Age</li> <li>4. Sex</li> <li>5. R/N</li> <li>6. Race</li> <li>7. Address</li> <li>8. Diagnosis</li> </ol>	<b>Equipment:</b> <ol style="list-style-type: none"> <li>1. TCD Machine</li> <li>2. TCD Gel</li> <li>3. Gauze</li> </ol>
2. Review patient's history	<ol style="list-style-type: none"> <li>1. History of Cerebral Vascular Accident (CVA)</li> <li>2. Medical history</li> </ol>		
3. Assessment	<ol style="list-style-type: none"> <li>1. General condition</li> <li>2. Side of stroke</li> </ol>		
4. Recording procedure	<ol style="list-style-type: none"> <li>1. Explain the procedure</li> <li>2. Position and make the patient comfortable</li> <li>3. Calibration</li> <li>4. Identify and eliminate or minimize biological and physical artifacts</li> <li>5. Record with appropriate windows and artery</li> </ol>	Flat baseline  <ol style="list-style-type: none"> <li>1. Middle Cerebral</li> <li>2. Artery (MCA)</li> <li>3. Posterior Cerebral</li> <li>4. Artery (PCA)</li> <li>5. Anterior Cerebral</li> <li>6. Artery (ACA)</li> <li>7. Basilar Artery (BA)</li> <li>8. Vertebral Artery (VA)</li> </ol>	

Activity	Work Process	Standard	Requirement
		<u>Optional</u> <ul style="list-style-type: none"> <li>• Common carotid artery</li> <li>• Carotid bifurcation</li> <li>• Internal carotid artery</li> </ul>	
5. Reporting	Compile and send record		
6. Documentation and dispatching of report	<ol style="list-style-type: none"> <li>1. Record and dispatch</li> <li>2. File report</li> </ol>		

## FLOW CHART TRANSCRANIAL DOPPLER (TCD)

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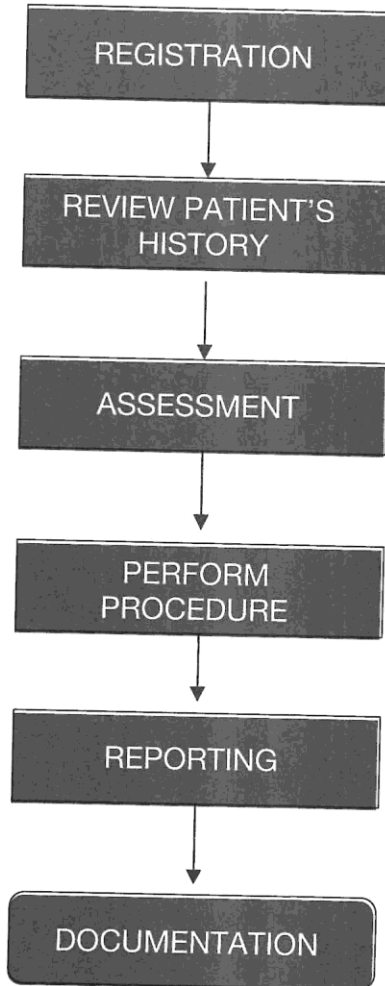
## 9. VIDEO TELEMETRY RECORDING (VTR)

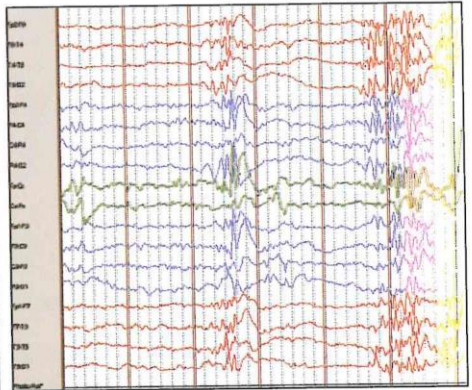
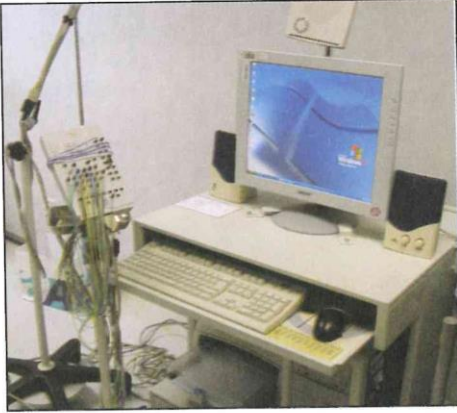
Activity	Work Process	Standard	Requirement
1. Registration	All patients should be registered in the standard registration book after receiving request form	1. Name 2. I/C No. 3. Age 4. Sex 5. R/N 6. Race 7. Diagnosis	<b>Equipment:</b> 1. VTR Machine 2. EEG Electrodes 3. Measuring tape 4. Dermatograph pencil
2. Review patient's history	1. History of sleep interference 2. Medication 3. Family history 4. Medical history		5. Skin conditioner 6. Gauze/Cotton 7. Micropore 8. Collodion / EEG Paste
3. Assessment	1. General condition 2. Cooperative /Uncooperative		9. Airgun/Dryer 10. Crepe bandage 11. Stockinet
4. Recording procedure	1. Explain the procedure 2. Position and make the patient comfortable 3. Measure, mark and attach electrodes correctly and securely 4. Fix other required gadgets 5. Calibration 6. Impedance check	Montreal System  1. Sensitivity 100 $\mu$ V 2. HFF 70 Hz 3. LFF 0.5 Hz 4. Time base 30 mm/sec 5. 10mm deflection at 100 $\mu$ V sensitivity  < 5 K $\Omega$	

Activity	Work Process	Standard	Requirement
	7. Identify and eliminate or minimize biological and physical artifacts 8. Record 9. Annotation of events 10. Calibration	Minimum 3 days/ 3 attacks  1. Sensitivity 100 $\mu$ V 2. HFF 70 Hz 3. LFF 0.5 Hz 4. Time base 30 mm/sec 5. 10mm deflection at 100 $\mu$ V sensitivity	
5. Reporting	1. Prepare factual report 2. Compile and send record for reporting		
6. Documentation and dispatching of report	1. Record and dispatch 2. File report		



## FLOW CHART VIDEO TELEMETRY RECORDING (VTR)





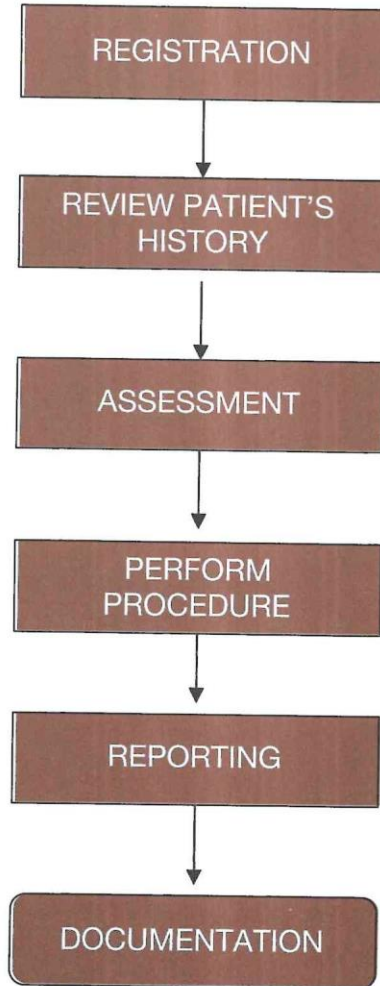
## 10. ELECTROCEREBRAL INACTIVITY (ECI)

Activity	Work Process	Standard	Requirement
1. Registration	<p>All patients should be assessed by a neurologist following guidelines in consensus on brain death.</p> <p>Patient's biodata to be entered appropriately after receiving request form</p>	<ol style="list-style-type: none"> <li>1. Name</li> <li>2. I/C No.</li> <li>3. Age</li> <li>4. Sex</li> <li>5. R/N</li> <li>6. Race</li> <li>7. Address</li> <li>8. Diagnosis</li> </ol>	<p><b>Equipment:</b></p> <ol style="list-style-type: none"> <li>1. EEG Machine</li> <li>2. EEG Electrodes</li> <li>3. Measuring tape</li> <li>4. Dermatograph pencil</li> <li>5. Skin conditioner</li> <li>6. Gauze/Cotton</li> <li>7. Micropore</li> <li>8. Collodion / ECG Paste</li> </ol>
2. Review patient's history	<ol style="list-style-type: none"> <li>1. Date of onset</li> <li>2. Medical history</li> <li>3. Medication</li> </ol>		
3. Assessment	<ol style="list-style-type: none"> <li>1. General condition</li> </ol>		
4. Recording procedure	<ol style="list-style-type: none"> <li>1. Measure, mark and attach electrodes correctly and securely</li> <li>2. Calibration</li> <li>3. Impedance check</li> <li>4. Identify and eliminate or minimize biological and physical artifacts</li> <li>5. Record with appropriate montages</li> </ol>	<p>Montreal System</p> <ol style="list-style-type: none"> <li>1. Sensitivity 100<math>\mu</math>V</li> <li>2. HFF 70 Hz</li> <li>3. LFF 0.5 Hz</li> <li>4. Time base 30 mm/sec</li> <li>5. 10 mm deflection at 100 <math>\mu</math>V sensitivity</li> </ol> <p>&lt; 5 K<math>\Omega</math></p> <p>Bipolar montage Minimum 20 minutes with sensitivity at minimum 2<math>\mu</math>V / mm for at least 10 minutes</p>	

Activity	Work Process	Standard	Requirement
	<ol style="list-style-type: none"><li>6. Annotation of events</li><li>7. Activation procedure</li><li>8. Calibration</li></ol>	<p>Pinching and clapping</p> <ol style="list-style-type: none"><li>1. Sensitivity 100<math>\mu</math>V</li><li>2. HFF 70 Hz</li><li>3. LFF 0.5 Hz</li><li>4. Time base 30 mm/sec</li><li>5. 10 mm deflection at 100 <math>\mu</math>V sensitivity</li></ol>	
5. Reporting	<ol style="list-style-type: none"><li>1. Prepare factual report immediately</li><li>2. Compile and send record for reporting as soon as possible</li></ol>		
6. Documentation and dispatching of report	<ol style="list-style-type: none"><li>1. Record and dispatch</li><li>2. File report</li></ol>		

## FLOW CHART ELECTROCEREBRAL INACTIVITY (ECI)

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## APPENDIX 1

**Request form for Electroencephalography (SOP 001), Polysomnography (SOP 006), Videotelemetry (SOP 009) and Electrocebral Inactivity (SOP 010).**

**JABATAN NEUROLOGI  
UJIAN E.E.G**

NL. 01

1. NAMA \_\_\_\_\_ 2. UMUR \_\_\_\_\_ 3. JANTINA \_\_\_\_\_ 4. NO. E.E.G. \_\_\_\_\_
5. TARIKH \_\_\_\_\_ 6. NO. DAFTAR \_\_\_\_\_ 7. NO. K.P. \_\_\_\_\_
8. DIAGNOSIS \_\_\_\_\_
9. SEJARAH (PEMBEDAHAN, KECEDERAAN KEPALA, UMUR MULA SAWAN, POLA KEKERAPAN, TARIKH KEJUTAN SEREBROVASKULAR, KECEDERAAN ATAU PEMBEDAHAN)
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
10. TARIKH INSIDEN TERAKHIR \_\_\_\_\_
11. PENEMUAN KLINIKAL POSITIF (Pemeriksaan Fisikal Neurologi) \_\_\_\_\_
12. PENEMPATAN KLINIKAL \_\_\_\_\_ 13. PENGIRI ATAU PEGANAN \_\_\_\_\_
14. PENGUBATAN \_\_\_\_\_ 15. TARIKH PENGUBATAN DIBERHENTIKAN \_\_\_\_\_
16. TARIKH E.E.G. TERDAHULU \_\_\_\_\_ 17. TUJUAN UJIAN E.E.G. \_\_\_\_\_
18. RANGSANGAN DIBENARKAN \_\_\_\_\_
19. HANTARKAN LAPORAN KEPADA \_\_\_\_\_ 20. WAD \_\_\_\_\_ 21. KLINIK \_\_\_\_\_
22. PAKAR PERUNDING/PAKAR \_\_\_\_\_ 23. TANDATANGAN DAN CIP PAKAR \_\_\_\_\_

(SILA PENUHKAN KAD INI DENGAN JELAS)

**Request form for Nerve Conduction Study (NCS)-Carpal Tunnel Syndrome (SOP 007)**

HKL/NEUR/AK-04-03



UNIT NEUROFISIOLOGI  
JABATAN NEUROLOGI  
HOSPITAL KUALA LUMPUR  
50586 JALAN PAHANG  
KUALA LUMPUR  
TEL : 03-26155408 FAX : 03-26911186



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**NERVE CONDUCTION STUDY (NCS) & ELECTROMYOGRAPHY  
(EMG) REQUEST FORM**

---

Date Of Request :

Date Of Appointment :

Name :

Age :

Sex :

Ward / Clinic :

R/N :

IC No :

Telephone no :

Address :

Clinical Summary :

Muscles with fasciculation :

Date Of injury :

Diagnosis :

Test Required :

Physician /Surgeon in Charge :

Signature :

Name :

**Request form for Transcranial Doppler (TCD)- (SOP 008)**

HKL/NEUR/AK-04-04



UNIT NEUROFISIOLOGI  
 JABATAN NEUROLOGI  
 HOSPITAL KUALA LUMPUR  
 50586 JALAN PAHANG  
 KUALA LUMPUR  
 TEL : 03-26155408 FAX : 03-26911186



**TRANSCRANIAL DOPPLER (TCD) REQUEST FORM**

Date Of Request :

Date Of Appointment :

Name :

Age :

Sex :

Ward / Clinic :

R/N :

IC No :

Clinical Findings :

Doppler Ultrasound of Carotids :

MRA Findings :

Singnature .....

Name .....

.....  
 TCD Findings : Flow Velocity ( cm/sec )

	R	L
CCA		
ICA		
MCA		
ACA		
PCA		
VA		
BA		

Comments :

Neurologist .....

Date : .....



**Request form for Visual Evoked Potential (VEP)SOP 003, Somato Sensory Evoked Potential (SSEP - Median Nerves) SOP 004 Somato Sensory Evoked Potential (SSEP – Posterior Tibial Nerves) SOP 005 and Brain Stem Auditory Evoked Potential (BAEP) SOP 002**

HKL/NEUR/AK-04-02



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JABATAN NEUROLOGI  
HOSPITAL KUALA LUMPUR  
50586 JALAN PAHANG  
KUALA LUMPUR  
TEL : 03-26155408 FAX : 03-26911186



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**EVOKED POTENTIAL (VEP/SSEP/BAEP) REQUEST FORM**

---

Date Of Request :

Date Of Appointment :

Name :

Age :

Sex :

Ward / Clinic :

R/N :

IC No :

Clinical Summary :

Height : ..... cm

Visual Acuity : ..... Right ..... Left .....

Hearing : .....

Diagnosis :

Test Required :

Physician /Surgeon in Charge :

Signature :

Name :

## REFERENCES

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12. Atlas of Electroencephalography: Volume Three- Neurological and Psychiatric Disorders by Frederic A Gibbs MD and Erna L Gibbs, Addison Wesley Publishing Company Ins.

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---

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Ministry of Health Malaysia

Dr. Mohd. Khairi bin Yaakob  
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Mr. Zulkifli Bin Majid  
Senior Medical Assistant  
Ministry of Health Malaysia

Mr. Mohd Radzi Bin Abdullah, AMN  
Senior Medical Assistant  
Ministry of Health Malaysia

## ACKNOWLEDGEMENT

---

The Documentation Committee of the Standard Operating Procedures (SOP) wish to express its appreciation and thanks to the following individuals for their invaluable contribution towards making the SOP a success :

- The Director General of Health, Malaysia
- The Deputy Director General of Health (Medical)
- The Director of Medical Development Division, Ministry of Health
- The Director of Medical Practice Division, Ministry of Health
- The Technical Advisor of SOP
- The members of Technical Committee
- The panel of reviewers
- The panel of contributors
- Secretary Training Division, Ministry of Health
- Medical Assistants Board, Ministry of Health
- The Principals of Medical Assistants Colleges
- All State Health Department
- All Hospitals, Ministry of Health
- All other individuals and organisation who have contributed directly or indirectly towards the success of this publication



Medical Assistant Board  
Ministry of Health Malaysia

ISBN 983-42618-4-5



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