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Competency statements- Somatosensory Evoked Potentials (SSEP)

These competency statements assume a University education including a bachelor of biomedical science or similar including major components of human anatomy and physiology.

Underpinning Knowledge

The following areas of knowledge are topics that relate to the competency statements required to perform a SSEP. These areas of knowledge are not included in the statements as topics that require competence in performance but would assist in a better understanding of the competencies required.

- Anatomical structures and function of the central nervous system
- Maturation and development of the central nervous system
- Electrophysiology of the peripheral nervous system
- The neurological examination
- Neuro-imaging techniques
- Diseases of the nervous system including but not limited to
    - Multiple sclerosis
    - peripheral neuropathy
    - spinal cord lesions
- Medications used for treatment of diseases of the nervous system
- Verbal and written communication skills
- Health and ethical principles

To perform SSEP

1. Core Knowledge
2. Preparation
3. Patient Care
4. Equipment
5. Electrode application
6. Recording
7. Interpreting the data
8. Completing the test
9. Presenting the data for reporting
10. Managing the recorded data

Appendix
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1. Core knowledge

The Neurophysiology Health Worker must be able to demonstrate an understanding of specialised knowledge in the following areas:

- Define anatomical structures and function of the
  - somatosensory nerve pathways
  - spine, spinal cord, cervical plexus, brachial plexus, lumbar plexus and sacral plexus
  - sensory cortex
- Describe the effects of diseases of the nervous system on the SSEP including but not limited to
  - Multiple sclerosis
  - peripheral neuropathy
  - spinal cord lesions
- Correlate the SSEP waveforms to the appropriate anatomical signal generators
- Identify the use of SSEPs during surgical procedures
- Identify the relevance of SSEPs in electro- cerebral silence (ECS)
- Describe analogue to digital conversion recording techniques
- Identify bandwidth and frequency response characteristics
- Identify and explain the implication and use of frequency filters
- Explain the function and purpose of differential amplifiers
- Define common mode rejection ratio and understand its function and purpose
- Identify the recording parameters and how they differ from display parameters including sensitivity, high frequency filters and low frequency filters
- Identify advantages and disadvantages of different types of electrodes
- Discuss sterilising procedures including high risk infectious diseases according to current Workplace Health and Safety (WH&S) and Infection Control (IC) regulations
- Identify the need to chloride and re-chloride silver electrodes
- Discuss the chemical and electrolytic process to chloride and de-chloride silver electrodes Explain the measurement of impedance
- Identify the importance of equal and low impedances in electrode application
- Explain the importance of normative data

2. Preparation

The Neurophysiology Health Worker must be competent in the following areas of SSEP preparation:

- Identify the process for patients to attend and leave the clinic
- Prepare consumables appropriately
- Perform routine maintenance of equipment
- Prepare and check equipment is set up according to manufacturer's specifications
- Identify and correct minor equipment faults
- Identify the process for arranging repair of more complex faults
- Prepare the environment according to WH&S regulations
- Identify and remove equipment likely to cause electrical interference
- Register correct data for patient
- Identify sufficient recording space for the recording
- Identify ethical issues that may occur during the recording
- Obtain appropriate patient consent

3. Patient Care

The Neurophysiology Health Worker must be competent in the following areas of SSEP patient care:

- Introduce self and others present
- Identify correct patient, correct procedure
- Evaluate clinical and patient information on the request form noting:
  - age of the patient
  - special care requirements
  - obtain relevant clinical history including
    - personal medical history
    - description of symptoms
    - medications
    - family history
  - indication for the test
  - contraindications for the test or part there of
  - identify the stimulation method to best suit the patient
  - identify the stimulation site to best suit the clinical presentation
- Demonstrate appropriate patient interaction
  - according to age, cultural differences and clinical state
  - provide sufficient pre-test information
  - gain sufficient pre-test information
    - measure the height and arm length of the patient
- Explain the procedure including answering questions
- Identify the need to adapt the SSEP procedure according to the information provided
- Position the patient for adequate accessibility, and patient comfort
- Recognise and respond when assistance is required
- Demonstrate patient confidentiality

4. Equipment

The Neurophysiology Health Worker must be competent in the following areas of SSEP equipment:

- Electrodes
  - identify advantages and disadvantage of different types of electrodes for the SSEP
  - prepare and clean electrodes for use according to WH&S and IC regulations
- Amplifiers
  - identify and explain the implication and use of frequency filters for the SSEP
  - identify the routine acquisition recording parameters for the SSEP
  - have knowledge of appropriate sample rates for the SSEP
- Stimulator
  - demonstrate the connection of the stimulator to recording equipment
  - differentiate between different types of stimulation applications (mechanical vs electrical)
  - identify the parameters of the stimulation
    - type
    - rate

        - duration
        - intensity

5. Electrode Application

The Neurophysiology Health Worker must be competent in the following areas of SSEP electrode application:

- Accurately apply electrodes according to the 10/20 electrode placement system and anatomical structures
    - prepare skin for application of recording electrodes adhering to WH&S and IC regulations
    - explain the importance of good electrode application
    - identify advantages and disadvantages of different types of application – surface electrodes with paste, surface electrodes with Collodion, sub-dermal needle electrodes, other
    - demonstrate appropriate stability of electrode application for the length of recording
    - identify the need for additional electrodes where appropriate
    - identify and implement infection control procedures
    - observe and apply standard precautions for contact, droplet and airborne infection risks when applying, removing and cleaning electrodes

6. Recording

The Neurophysiology Health Worker must be competent in the following areas of SSEP recording:

- Connect electrodes to the pre-amplifier
    - connect electrodes to the pre-amplifier according to electrode placement
    - arrange leads and pre-amplifiers to minimise environmental artefacts
- Accurately attach stimulation apparatus to patient
- Identify the appropriate electrode impedance for SSEP
    - define the required impedance level for recording
    - read impedance measurement and adjust where appropriate
    - adjust impedance where appropriate

- Define machine settings used for SSEP
    - define the machine settings including sensitivity, filters, sweep duration, number of averaged sweeps, automatic rejection
    - explain the relevance of the machine settings to the recording
    - use machine settings according to departmental protocols
    - identify stimulator settings including type, rate, duration and intensity
    - alter control settings when appropriate
- Identify the appropriate montages for the SSEP
    - identify the montage used for the SSEP
    - discuss advantages and disadvantages of the number of recording channels for the SSEP
- Recognise artefacts
    - identify artefacts and their sources
        - instrumental and or environmental artefacts

        - physiological artefacts
    - eliminate or minimise source of artefact
- Record the SSEP
    - identify the main sensory pathways including stimulation sites for upper and lower limb SEPs
    - evaluate the appropriate sensory stimulation level
    - identify appropriate number of sweeps for best signal to noise ratio for recording SSEP
    - demonstrate reproducibility of recorded waveforms
    - follow departmental protocol
    - adjust recording and or stimulation procedure where appropriate
- Annotation of the recording
    - annotate recorded traces to identify appropriate waveform latencies and amplitudes
    - annotate stimulation method used

7. Interpreting the data

The Neurophysiology Health Worker must be competent in the following areas of SSEP interpretation:

- Identify the SSEP waveforms
    - identify normal waveforms including latencies and amplitude of the expected SSEP appropriate for age and normative data
    - identify abnormal waveforms including latencies, inter-peak latencies amplitudes, and side to side differences according to age and normative data
- Correlate the SSEP waveforms to the appropriate anatomical signal generators

8. Completing the SSEP

The Neurophysiology Health Worker must be competent in the following areas of completing the SSEP:

- Check electrode integrity
- Validate recording on completion
- Remove electrodes according to different applications, WH&S and IC regulations and patient comfort.
- Remove electrolyte from patient
- Assist patient as required
- Inform patient of the process for obtaining results
- Dispose of materials according to waste management, WH&S and IC regulations
- Clean recording electrodes in accordance with WH&S and IC regulations

9. Presenting SSEP for reporting

The Neurophysiology Health Worker must be competent in the following areas of presenting SSEP for reporting:

- Present recorded traces for interpretation
- Present tabulated data (latencies and amplitudes) for interpretation

10. Managing the recorded data

- Archive recording

- Maintain database of recording

Appendix – Stakeholders

Stakeholders

- ANTA Inc. Members
- Document Development Committee
- Document Development Committee Advisory Group
- Other interested parties

Document Development Committee (2014-2015)

Joanne Wex, Angela Borbelj, Anna Exley, Holly Campbell, Mary Lynch, , Santhi Chigurupati, Malcolm Corkhill, Amy Lofts, Vicky Grant, Samantha Soe.

Advisory Committee

The document development committee identified a group of key stakeholders to view the draft documents for feedback. The advisory group was made up of technologists, scientists and neurologists working in the neurophysiology industry around Australia. The comments from this group were considered, compared against the reference material and included where appropriate.

Members Feedback

On completion of the final draft the document was put out to all members of ANTA Inc. for feedback. The comments from members were considered, compared against the reference material and included where appropriate.

Amendment

2023 July Rebranded to ANSA Inc

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