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COLLEGE OF PHYSICIANS
& SURGEONS OF ALBERTA

Neurodiagnostic Standards – Electromyography & Nerve Conduction Studies

Version April 2016 – v24

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Originating Committee:	**Advisory Committee on Clinical Neurodiagnostics**

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1.0 Introduction

Alberta's *Health Professions Act* provides for the accreditation of medical services in non-hospital facilities by the College of Physicians & Surgeons of Alberta. Section 8.1 in Schedule 21 of the *Act* states:

> **8.1(1)** A regulated member shall not provide a prescribed health service, or cause a prescribed health service to be provided, in a facility unless the facility is an accredited medical facility or a facility referred to in subsection (2).
>
> **(2)** Subsection (1) does not apply with respect to a prescribed health service provided in
>
> (a) an approved hospital within the meaning of the *Hospitals Act*,
>
> (b) a hospital operated by the Government of Canada,
>
> (c) a health care facility operated by the Government of Canada or the Government of Alberta,
>
> (d) a hospital, clinic or centre operated by a regional health authority under the *Regional Health Authorities Act*,
>
> (e) a facility within the meaning of the *Mental Health Act* or an accredited health centre established for the purpose of section 49(b) of the *Mental Health Act*, or
>
> (f) a facility that is prescribed in the regulations.

Neurophysiology services are one of many health services for which the CPSA requires accreditation. A complete list of prescribed health services is contained in the CPSA's by-laws and available on the CPSA's website.

The CPSA also applies its accreditation standards to Neurophysiology services in approved hospitals through contract with Alberta Health Services.

The Advisory Committee on Clinical Neurophysiology is a standing committee of the College of Physicians & Surgeons of Alberta which advises the Medical Facility Accreditation Committee (MFAC) of the CPSA with respect to all matters pertaining to neurophysiology facilities. The CPSA provides this service to those facilities approved under the Hospitals Act through contract with Regional Health Authorities.

The Committee may consider issues related to the provisions of neurophysiology services, and these issues may include, but are not restricted to, the following:

1. Develop and maintain evidence based standards/guidelines for clinical neurophysiology practice;
2. Monitor compliance with CPSA approved standards through on-site assessments for accreditation;
3. Assess physicians' qualifications and preparedness to interpret neurophysiology studies against CPSA approved training requirements for EEG, EMG and EP;
4. Provide education to promote safety and quality improvement initiatives;
5. Facilitate of the introduction of new services;
6. Respond to the needs of stakeholders for improved clinical neurophysiology services in Alberta;
7. Review and audit of the business practices of the facility to ensure compliance with relevance CPSA by-laws.

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The CPSA requires all accredited medical facilities to have a Medical Director (i.e. a practitioner who is registered with the Alberta College of Physicians & Surgeons) who is accountable for the practice of medicine within the facility. Medical Directors shall be satisfied as to the standing of other professionals with their respective regulatory bodies and as to the safety of their practices.

Note: This document incorporates standards and guidelines in a diagnostic and treatment facility approved by CPSA Council:

- **"shall" is used when a section is a requirement for accreditation;**
- **"should" is used when a section is recommended; and**
- **"may" is used when a section is discretionary.**

Due to the constantly changing spectrum of medicine, these standards/guidelines will be reviewed on a regular basis and revised when necessary. Input from facilities is encouraged to assist in keeping the document up to date.

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2.0 Role of the CPSA

2.1 Accreditation of Facilities

2.1.1 All neurophysiology facilities shall register with and maintain accreditation by the CPSA.

2.1.2 Applications for accreditation of new facilities shall be made to the CPSA.

2.1.3 Requests for additional modalities shall be made to the CPSA.

2.1.4 The Standard of Practice #20 – Direction and Control of Medical Practice as established by the Council of the CPSA are applicable for privately owned facilities.

2.1.5 Accreditation involves:

1. A review of a pre-assessment data verification form completed by the facility for each modality;
2. A review of selected tracings, requisitions/in-house worksheets and reports from the facility;
3. A review of the facility's manuals outlining policies and procedures;
4. A review of qualifications and training of medical and technical personnel.

2.1.6 The review, which is completed by one or more physicians (with expertise in the appropriate area of medical practice) and an Assessment Coordinator designated by the CPSA, is either a distance review, an on-site review, or a combination of both.

2.1.7 "Full Accreditation" is granted to those facilities with no identified deficiencies.

2.1.8 "Provisional Accreditation" may be granted for a 30-day period to those facilities with minor deficiencies to allow for their correction. A written response to each deficiency is required from the medical director/consultant of the facility. A follow-up assessment may be required at the sole discretion of the CPSA. "Full Accreditation" will be granted when responses to deficiencies have been corrected to the satisfaction of the CPSA.

2.1.9 Requirements shall be met before accreditation will be granted or renewed by the CPSA.

2.1.10 The CPSA may revoke accreditation if practice in the facility is considered unsafe.

2.1.11 A "Certificate of Accreditation" will be issued by the CPSA to all facilities with "Full Accreditation".

2.1.12 Accreditation is limited to 4 years from the last date of approval unless extended by the CPSA and may be renewed through a process of re-accreditation which will follow the same steps as those for accreditation (refer to Section 2.1.5).

2.1.13 Payment to the CPSA for the cost of the assessment is the responsibility of the Medical Director of the facility. (Private facilities only)

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2.1.14 "Spot" assessments conducted without prior notice may also be conducted. These are at no cost to the facility.

2.2 Administration

2.2.1 A record of each facility shall be kept on file at the CPSA.

2.2.2 The CPSA shall be advised of any change of ownership of the medical practice or Medical Director of the facility.

2.2.3 Each facility is required to pay an annual fee, set by Council, for the administration of the accreditation program. (Private facilities only)

2.2.4 Any significant increase in volumes of procedures performed (>50% of current volume).

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3.0 Personnel

All physicians practicing electromyography in Alberta are encouraged to complete the EMG examination of the Canadian Society of Clinical Neurophysiologists (CSCN) or the American equivalent.

3.1 Medical Director

3.1.1 Qualifications

1. The director of each facility shall be:

   A physician licensed to practice medicine in Alberta and certified as a specialist in Neurology (adult or pediatric), Neurosurgery, Physical Medicine and Rehabilitation, or Pediatrics (with extra training in Neurology, which is suitable to Council).

   -and-

2. Qualified and accredited to interpret electromyograms in Alberta.

3.1.2 Role

1. The Medical Director shall have direct control and be responsible for provision of neurophysiology services.

2. Responsibilities may include, but is not restricted to, the following:

   a. The day to day direction and supervision of the practice of medicine.

   b. Providing continuous, adequate and effective direction and supervision of assistant electromyographers and technical staff.

   c. Ensuring an adequate quality assurance program is in place.

   d. Selection of testing procedures and equipment used.

   e. Ensuring the "Minimal Technical Standards" of the **Canadian Association of Electroneurophysiology Technologists, Inc.** (CAET) are met.

   f. Ensuring the reporting standards of the **Canadian Society of Clinical Neurophysiologists (CSCN)** are met.

   g. Establishing and maintaining effective and appropriate safety procedures.

   h. Ensuring appropriate "manuals" are in place and up-to-date.

   i. Remitting an annual fee as determined by Council (private facilities only).

   j. Making available for accreditation the requested documentation.

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3. The Medical Director shall ensure that all physicians interpreting EMG studies are current in their practice as defined in 3.2.2.

3.1.3 Continuing education is recommended.

3.2 Medical Director (Local)

3.2.1 Facilities without a medical director, who is qualified to interpret studies, require a qualified consultant. A Medical Director (Local) shall be appointed and the responsibilities include:

1. Overseeing the day to-day operation of the facility, but not the technical elements involved in producing studies and reports.

2. Supervising technical staff in regard to patient care issues.

3. Maintaining effective and appropriate safety.

4. Ensuring required documentation is complete.

5. Working with the consultant to meet the technical and other accreditation standards for these facilities.

6. Representing the facility in local and regional administrative matters.

3.3 Consultant

3.3.1 Qualifications

1. Be a physician licensed to practice medicine in Alberta and certified as a specialist in Neurology (adult or pediatric), Neurosurgery, Physical Medicine and Rehabilitation, or Pediatrics (with extra training in Neurology, which is suitable to Council).

-and-

2. Qualified and accredited to interpret electromyograms in Alberta.

3.3.2 Responsibilities of a consultant include:

1. Ensuring maintenance of standards set by provincial and federal authorities.

2. Instituting and ensuring maintenance of an adequate quality assurance program including the periodic review of quality control results.

3. Ensuring appropriate manuals are in place and up-to-date.

4. Visiting the facility to assist in meeting these standards.

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5. Participating in the preparation of an annual report of the facility for the Regional Health Authority which may include:

   a. equipment evaluation
      - preventative maintenance
      - service type and volume
      - calibration
      - quality control
   b. quality assurance activity
   c. policy and procedure manuals
   d. assessment of technologist(s) performance

3.4 Interpreter

3.4.1 Approval

1. Physicians performing Electromyography shall:

   a. Be a physician licensed to practice medicine in Alberta and certified as a specialist in Neurology (adult or pediatric), Neurosurgery, Physical Medicine and Rehabilitation, or Pediatrics (with extra training in Neurology, which is suitable to Council).

   -and-

   b. Complete a minimum of a six-month block of full-time formal EMG training or an equivalent training completed within a two-year period.

   NOTE: Training shall be obtained in a laboratory, which performs a wide variety of neuromuscular studies in adult and pediatric patients annually.

   -and-

   c. Provide evidence of satisfactory completion of training.

2. Physicians completing training after July 1, 2005, shall pass the Canadian Society of Clinical Neurophysiologists (CSCN) examination in electromyography or an equivalent certification examination in another country acceptable to Council **within two years** of completion of the above training.

3. Physicians who completed training described in section 1 and 2 prior to July 1, 2005 and who have remained in the active practice of EMG are eligible for approval to interpret EMG in Alberta.

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4. Continuing education in electromyography that is eligible for credits in the Maintenance of Certification Program of the Royal College of Physicians and Surgeons of Canada is recommended.

NOTE: Physicians performing Electromyography in specific anatomical areas shall provide evidence of training, which is satisfactory to the Committee.

3.4.2 Re-approval

1. An interpreter who has been accredited or grandfathered, but who has not been in the active practice* of EMG for the last three years, shall perform under direct supervision a minimum of thirty (30) EMGs and nerve conduction studies.

Note: The following will be used as a guide in reviewing requests for reaccreditation:

a. *Original training*
b. *Experience in practice*
c. *Extent of related activity during time away from relevant practice.*
d. *Content of a retraining program, including an expectation of:*
   i. Completion over a reasonably brief time (i.e. weeks or months, but not years);
   ii. Review of relevant current literature;
   iii. Degree of supervision;
   iv. Method of evaluation of competence.

e. Credentials of the preceptor and details contained in the letter attesting to his or her satisfaction with the applicant's abilities.

***"Active practice" refers to interpreters interpreting a minimum of 100 EMG studies per year.**

3.5 EMG Technologists

3.5.1 Personnel performing EMG procedures:

Shall have an accredited physician available to design the study.

Shall successfully pass the examination of the Board of Registration of EMG Technologists of Canada (BRETC) or the American equivalent.

or

Be training under supervision of an accredited physician or RT (EMG) to meet prerequisites for participation in the BRETC examination and shall have a physician or RT immediately available within the facility.

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3.5.2 Personnel shall participate in continuing education.

3.5.3 A detailed training protocol shall be in place for new staff.

3.5.4 All personnel in the facility shall have detailed job descriptions.

3.5.5 Annual performance evaluations of Technologists shall be performed.

3.5.6 Membership with the Association of Electromyography Technologists of Canada (AETC) should be maintained.

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4.0 Facility Operation

4.1 Physical

4.1.1 Space for the following should be adequate:

1. Patient waiting facilities
2. Patient washroom facilities
3. Clerical facilities
4. Supply storage
5. Record storage

4.1.2 The following should be adequate:

1. Room temperature control
2. Facility ventilation
3. Facility lighting
4. Emergency lighting
5. Noise level
6. Cleanliness
7. Stretcher access

4.2 Communication

4.2.1 There should be sufficient telephones.

4.2.2 There shall be written criteria for significant abnormal findings that require urgent notification.

4.2.3 There shall be a written process for notification of significant abnormal findings by telephone or hand-delivery.

4.2.4 All notifications shall be documented.

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5.0 Off-Site Testing

If off-site testing using mobile equipment is done from the "base" laboratory:

5.1 The role of the Medical Director shall apply.

5.2 Application for each off-site location shall be made by the medical director of the base laboratory.

5.3 Studies performed for each off-site location shall be reviewed in conjunction with the base laboratory.

5.4 The testing site shall be identified on the report and the records from off-site locations shall be identifiable.

5.5 Copies of the studies shall be kept on file at the base laboratory.

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6.0 Electromyography Procedures

6.1 An electromyography consultant shall assess and supervise each patient for nerve conduction studies and personally perform all EMG needle examinations.

6.2 Appropriate procedures:

6.2.1 Nerve conduction studies and electromyography, technical and interpretation

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7.0 Normative Values

7.1 The EMG laboratory shall establish normative values with consistent filter settings, sweep speeds, sensitivities, distances and electrode separations, utilizing appropriate sampling of age and gender.

7.2 The normative values shall be quantifiable, reproducible and statistically valid.

7.3 Stimulating and recording parameters shall be duplicated if published normals are being used.

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8.0 Request for Consultation

8.1 Information documented by the facility prior to procedures being performed:

8.1.1 Shall include the following:

1. Patient's name
2. Patient's contact information
3. Patient's birthdate
4. Name of referring physician or nurse practitioner
5. Second patient identifier - which shall be the unique lifetime identifier whenever possible.

8.1.2 Should include the following:

1. Pertinent history, including medications.

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9.0 Patient Preparation

9.1 Documentation

9.1.1 The pre-test documentation shall include:

1. Confirmation that the procedure was explained to the patient by either the technologist or physician.
2. Any additional relevant clinical information.
3. Any contraindications to testing.
4. Any additional comments if applicable.
5. Any previous EMGs.

9.2 Skin Preparation

9.2.1 Surface skin oils, perspiration and dirt shall be removed from a patient prior to nerve conduction studies by cleansing with soap and water or alcohol swabbing and drying, as appropriate.

9.2.2 Abrasives should be used only when necessary.

9.2.3 Cold extremities should be warmed prior to testing.

9.2.4 Skin temperatures shall be documented at time of testing.

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10.0 Testing/Recording Procedures

Testing/recording procedure should meet or exceed the Minimal Technical Standards of the **Canadian Association of Electroneurophysiology Technologists (CAET)** and the Minimum Standards for Electromyography in Canada of the **Canadian Society of Clinical Neurophysiologists (CSCN)** 2002 guidelines Section C**.**

10.1 Recording Preparation - Techniques

10.1.1 Techniques employed in the performance of nerve conduction studies and needle EMG shall be consistent with CSCN standards.

10.1.2 Studies shall include comprehensive contralateral counterpart testing with comparison of unaffected limb, muscle and nerve unless compelling reasons indicate limited studies are appropriate.

10.1.3 The ground electrode shall be applied first and placed in a position between the recording and stimulating electrodes.

10.1.4 During studies of motor nerves, the belly-tendon method of recording shall be followed to maximize waveform morphology and amplitude and avoid initial negativity of response.

10.1.5 This method shall involve the active electrode being placed over the belly of the appropriate muscle and the reference electrode placed in the silent electrical region to maintain at or near zero potential with respect to the recording electrode.

10.1.6 Active and reference electrodes shall be separated by at least 3 cm to optimize the recording potential.

10.1.7 During studies of sensory nerve, consistent distances between recording electrodes shall be used to reduce variability with both G1 and G2 recording over nerve.

10.1.8 Consistent distances between recording and stimulating electrodes shall be used when obtaining distal atencies.

10.1.9 Distance measurement shall follow as close as possible the anatomic course of the nerve along the limb surface.

10.1.10 Proximal stimulation sites shall be 10 cm or greater apart.

10.1.11 The following techniques to reduce stimulus artifact shall be employed when required:

1. Properly orienting stimulating electrodes, utilizing anode rotation.
2. Checking electrode impedance.
3. Removing excess conduction cream or gel and perspiration.
4. Reducing stimulus duration and intensity while maintaining supramaxamimal stimulation.
5. Avoiding short distances between stimulating and recording electrodes.

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10.2 Supramaximal Stimulation

10.2.1 During assessment of conduction, there shall be a gradual increase in the intensity of the stimulus once a response is visualized until a plateau in the amplitude of the response occurs.

10.2.2 The intensity shall be increased a further 10-20 percent to ensure activation of the fastest conducting fibers.

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11.0 Recordings

11.1 All recordings shall include the following:

1. Patient's name
2. Date of recording
3. Name of recording technologist
4. Second patient identifier - which shall be the unique lifetime identifier whenever possible.

11.2 Appropriate notations should be made on the recording throughout the procedure.

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12.0 Reports

12.1 Demographics

12.1.1 Reports shall include the following:

1. Laboratory name, address, and phone number
2. Patient's name
3. Name of referring physician
4. Date of procedure
5. Date of transcription
6. Second patient identifier - which shall be the unique lifetime identifier whenever possible.

12.1.2 Reports should include the following:

1. History & comments

12.2 Interpretations

12.2.1 An individual accredited to do EMG consultation is responsible for the recorded interpretation of tests and reporting them to the referring physician.

12.2.2 Interpretations shall indicate authorship and whether or not the contents of the report have been verified by the author. (A signature means that the contents have been verified by the signator.)

12.2.3 The minimum reporting standards of the **Canadian Society of Clinical Neurophysiologists (CSCN)** shall be met. (Appendix A)

12.2.4 Requests for urgent interpretations should be given a priority.

12.2.5 Reports should be in type written format.

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13.0 Storage and Retention of Records

13.1 The entire interpretive report and the physiologic data, whether abnormal or not, shall be retained for a minimum of ten years by electronic means or hard copy. In the case of minor patients, they shall be retained for ten years or two years after the age of majority, whichever is greater.

13.2 Records pertaining to quality assurance in the laboratory shall be kept for a minimum of two years.

13.3 The service provider shall maintain safeguards to protect the confidentiality of patient records and to protect against reasonably anticipated threats or hazards to the security, integrity, loss or unauthorized use, disclosure, modification or unauthorized access to health information. This applies to records in paper or electronic format.

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14.0 Manuals

14.1 Laboratories shall have current and comprehensive manuals in place.

14.2 All procedures shall initially be approved and signed by the medical director.

14.3 Subsequent to initial approval, all procedures shall be reviewed annually and signed by the medical director or designate. Any changes in the interim shall be approved and initialed by the director.

14.4 All changes to procedures shall be approved and initialed by the medical director.

14.5 The following manuals shall be available in the laboratory:

14.5.1 Equipment Manual

1. This manual shall include, as a minimum, for each piece of equipment:

    a. List of contact personnel and phone numbers
    b. Manufacturer operating and troubleshooting instructions
    c. Copy of maintenance contract, if applicable
    d. Preventative maintenance schedule
        i. Daily
        ii. Weekly
        iii. Monthly
        iv. Annually

2. This manual shall include records for:

    a. Preventative maintenance
    b. Repairs
    c. Electrical checks

14.5.2 Policy Manual

1. This manual shall include, as a minimum, the following sections:

    a. Organizational chart
    b. Staff/office policies
    c. Procedure policies

14.5.3 Procedure Manual

1. This manual shall include, as a minimum, the following for each procedure performed:

    a. Name of procedure
    b. Equipment used
    c. Technique and Procedure
        i. Pre-test documentation
        ii. Skin preparation
        iii. Electrode placement

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d. Recording Procedure
    i. Techniques
    ii. Calibration
e. Special Precautions, Safety, Notes
f. Normative Values
g. Critical Abnormalities
h. References

14.5.4 Safety Manual

1. This manual shall include, as a minimum, the following sections:

    a. General Safety
    b. Fire Safety
    c. Electrical Safety
    d. Infection Control (Appendix B)
    e. Medical Emergencies
    f. Waste Disposal

2. This manual shall include records for:

    a. Incidents
    b. Electrical checks

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15.0 Equipment

15.1 General

15.1.1 Equipment shall meet or exceed the standards of the **Canadian Society of Clinical Neurophysiologists (CSCN)** 2002 guidelines Section C**.**

15.2 Amplifier

15.2.1 The amplifier shall be capable of emphasizing EMG signals in the frequency range of 2 Hz to 20 kHz.

15.2.2 Signals ranging from less than 1 microvolt to greater than 10 mV (10,000 fold range) shall be accurately reproduced.

15.2.3 The common mode rejection of the amplifier shall exceed 100,000 Ohms.

15.2.4 The inherent noise in an amplifier shall be less than 2 microvolts.

15.2.5 Low (2-5 Hz) and high (2-20 kHz) frequency cutoffs should be appropriate for types of electrical activities studied.

15.2.6 The amplifier shall be equipped with an accurate time base generator and controls for range of sweep durations from <10 milliseconds to 1 second.

15.2.7 During nerve conduction studies, the stimulus shall trigger the sweep.

15.2.8 The amplifier shall offer auditory monitoring of muscle activity and the delivery of stimuli.

15.3 Display Apparatus

15.3.1 The oscilloscope display shall be of such clarity as to allow the operator to visually assess onset lantencies, peaks and amplitudes at all ranges of sensitivity and time base.

15.3.2 The display should allow for post-acquisition manipulation of sensitivity and time base with minimal distortion.

15.3.3 The display apparatus shall produce an equally accurate and clear hard copy of traces.

15.4 Stimulator

15.4.1 The electrode stimulator shall be capable of delivering either single or repetitive stimuli (up to 5 per second) of either constant current or constant voltage.

15.4.2 Separate controls shall be available for both variable intensity (minimum up to 200 V, 100 MA) and duration (0.05 to 1 msec) of stimulus.

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15.5 Electrodes

15.5.1 Reusable needle electrodes should be inspected under magnification and by impedance measurements to ensure structural integrity.

15.6 Ancillary Equipment

15.6.1 All ancillary equipment shall be CSA approved.

15.6.2 There shall be yearly maintenance checks and this shall be documented.

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16.0 Safety

16.1 General Safety

16.1.1 The laboratory shall have a Safety Manual (Refer to Section 16.0 Manuals), which is specific to the laboratory that staff shall follow.

16.1.2 It should be readily available to all personnel and there should be evidence that they are aware of its content.

16.1.3 Policies and procedures should be developed regarding the documentation of all incidents.

NOTE: An incident is an occurrence, which either harmed or could have harmed a patient or a staff member.

16.2 Fire Safety

16.2.1 This shall be specific for the laboratory and be in conformity with that of your institution and local fire department.

16.3 Electrical Safety

16.3.1 All equipment shall be checked for grounding and current leakage at least annually, and this shall be documented.

16.3.2 Precautions regarding electrical safety shall be as per CSCN standards and CAET. ("Standard One: Minimal Technical Standards Clinical Electroencephalography Routine Adult.)

16.4 Infection Prevention and Control

These standards have been adapted from *Health Canada – Infection Control Guidelines – Hand Washing, Cleaning, Disinfection and Sterilization in Health Care* and *Health Canada – Infection Control Guidelines – Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care.*

Routine infection control practices should be incorporated into everyday patient/resident/client care. Institutional policy should provide for education of every care provider in the principles of routine precautions, provision of adequate equipment to implement them, and a means by which compliance with practice can be monitored and audited.

To minimize the risk of transmission of infection, patients/residents/clients (referred to henceforth as "patients") should be assessed for infection or potential infections upon admission. Each facility should endeavor to have some assessment procedure in place; the results should be communicated to other personnel providing care and should be documented in the patient record.

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In situations requiring additional precautions, these precautions must be instituted as soon as indicated by triggering mechanisms such as diagnosis, symptoms of infection, laboratory information, or assessment of risk factors.
The institution/facility is responsible for ensuring that appropriate precautions are taken for specific patients.

All personnel (physicians, nurses, technologists/technicians, students, volunteers and others) are responsible for complying with routine and additional precautions and for tactfully calling observed infractions to the attention of all offenders. There are no hierarchical exceptions to precautions, and everyone has a responsibility to monitor his or her own practice as well as the practice of other care providers. There are no exceptions, and all should teach by example.

16.4.1 Occupational Health/Immunization

The *Occupational Health and Safety Act, Regulation and Code* will also apply. Copies of the OHS Act, Regulation and Code, and *"A Physician's Guide to Occupational Health and Safety Responsibilities"* are available on-line at www.worksafely.org.

1. All personnel, including physicians should have their immunization status reviewed and documented at the time they commence employment at the facility and periodically thereafter.

2. Personnel that are unable to provide acceptable evidence of adequate immunity against hepatitis B, influenza, measles, mumps, rubella, and varicella; should be advised to speak to their physician about immunization.

3. Employers should consider measles, mumps, rubella, hepatitis B and varicella immunity as a condition of employment.

4. Tuberculin skin testing is recommended for all personnel at the beginning of their employment.

5. All personnel shall understand and adhere to *"Routine Practices"* which incorporate universal blood and body fluid precautions such as described in the *"Health Canada Infection Control Guideline: Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care.* (This guideline is available on-line at *http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/99pdf/cdr25s4e.pdf).*

6. There shall be a policy and procedure for the management of significant exposures (e.g. needle-stick injuries).

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7. Consultation with a specialist in infectious disease shall be obtained prior to workers with blood-borne pathogens starting work in the facility. *"Health care workers who perform exposure-prone procedures have an ethical obligation to know their serologic status for hepatitis B virus (HBV), human immunodeficiency virus (HIV) or hepatitis C virus (HCV) and to follow the recommendations in 'Proceedings of the Consensus Conference on Knfected Health Care Workers: Risk for Transmission of Bloodborne Pathogens,'* (This document is available on-line at http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/98vol24/24s4/24s4b_e.html*).*

16.4.2 General Infection Prevention Measures

1. Adequate hand washing sinks shall be appropriately located throughout the facility. Waterless, alcohol based antiseptic hand agents are an acceptable alternative to soap and water, if there is no visible soiling.

2. Hands shall be washed between patients, after removal of gloves, when visibly soiled and after contact with any contaminated objects.

3. Hand washing with an antiseptic agent shall be used:
   a. before performing invasive procedures;
   b. before contact with immunocompromised patients;
   c. before contact with patients with extensive skin damage.

4. There shall be no re-use of critical or semi-critical medical equipment labeled as single-use by the manufacturer.

5. Masks, eye protection and face shields shall be worn for protection of mucous membranes of the eyes, nose and mouth during procedures likely to generate splashes or sprays of blood, body fluids, secretions or excretions.

6. Clean non-sterile gloves shall be worn:
   a. for contact with blood, body fluids, secretions and excretions, mucous membranes, draining wounds or non-intact skin (open skin lesions or exudative rash);
   b. when handling items visibly soiled with blood, body fluids, secretions or excretions;
   c. when the healthcare worker has open lesions on the hands.

7. Gloves are to be changed between care activities and procedures with the same patient after contact with materials that may contain high concentrations of microorganisms.

8. Gloves are to be removed immediately after completion of care or procedure, at point of use and before touching clean environment surfaces.

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9. There should be a designated person responsible for the maintenance and enforcement of infection control and occupational health standards in the facility.

16.4.3 Additional Precautions

1. Airborne Transmission Precautions

   a. Patients with known or suspected infectious tuberculosis, measles, varicella or disseminated zoster should be placed directly in a single examination room and the door shall remain closed.
   b. Those patients shall wear a surgical/procedure mask during transport and movement through the facility.
   c. High efficiency dust/mist masks shall be worn by all healthcare workers who enter the examination room of a patient with infectious tuberculosis.
   d. High efficiency dust/mist masks shall be worn by non-immune healthcare workers who absolutely must enter the examination room of a patient with varicella, disseminated zoster or measles.

2. Droplet Transmission Precautions

   a. Patients with known or suspected meningococcal infection,, rubella, mumps, pertussis, diphtheria, or hemorrhagic fevers should be placed in a single examination room. If this is not possible the patient shall maintain a one meter spatial separation between other patients.
   b. Surgical/procedure masks should be worn by all healthcare workers that must come within one meter of the patient.
   c. The patient shall wear a surgical/procedure mask during transport and movement through the facility.

3. Contact Transmission Precautions

   a. Patients with know or suspected diarrhea, extensive skin or wound infection not contained by dressings, hemorrhagic fevers, meningitis, hepatitis, herpes simplex-disseminated, scabies (extensive or Norwegian/crusted), varicella, disseminated or extensive uncovered zoster and Antibiotic Resistant Organisms (ARO) should be placed in a single examination room. If this is not possible, a spatial separation of one meter shall be maintained between patients.
   b. Gloves should be worn when entering the patient's room or designated examination space.
   c. Gloves shall be removed before leaving the patient's room or designated examination space.
   d. Hands shall be washed immediately, first with soap and water if visibly soiled, then an antiseptic agent.

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e. Equipment and surfaces in direct contact with the patient or infective materials shall be cleaned before the room is used by another patient.

16.4.4 General Environmental and Equipment Cleaning

1. A barrier (sheet or paper) should be placed on the examination table. The barrier shall be changed between patients.

2. If no barrier is used, the examination table shall be cleaned between patients.

3. The examination table shall be cleaned between patients if visibly soiled.

4. Items touching mucous membranes or non-intact skin shall be appropriately disinfected between patients.

5. Chairs, cabinets and charts are not usually an infection risk, but should be cleaned on a regular basis.

6. Walls, blinds and curtains should be cleaned regularly and when soiled.

7. Floors should be cleaned regularly, with damp mopping preferred.

8. Carpets/upholstery should be vacuumed regularly and shampooed as necessary.

9. Toys shall be regularly cleaned, disinfected with a low level disinfectant, thoroughly rinsed and dried.

16.4.5 Equipment Cleaning, Disinfecting and Sterilization

1. There shall be written policies and procedures for cleaning and sterilizing specialized equipment as described in *Health Canada – Infection Control Guidelines – Hand Washing, Cleaning, Disinfection and Sterilization in Health Care. This guideline is available on-line at www.phac-aspc.gc.ca/dpg_e.html#infection.*

2. Personnel involved in the cleaning, disinfecting and sterilization of equipment shall be properly trained.

3. There shall be a designated area for soiled supplies. This area shall be physically separated from patient care areas and from areas housing clean and sterile supplies.

4. Personnel working in the soiled area shall have proper protective apparel for their personal protection.

5. Clean and sterile supplies shall be stored in an area protected from dust and moisture, with access limited to authorized personnel.

6. Sterile supplies shall be clearly marked.

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7. The **Infection Control Guidelines for Neurophysiology Facilities** of the College of Physicians & Surgeons shall also apply. (Appendix B)

16.5 Medical Emergencies

16.5.1 There shall be policies and procedures in place to deal with medical emergencies.

16.5.2 The following medical emergency equipment and supplies should be kept in stock, such as:

1. Equipment
   a. Stethoscope and Blood Pressure Cuffs
   b. Oral Airways: Adult and Pediatric
   c. Pocket Mask (bag valve mask optional)
   d. Appropriate Syringes, tape, needles

2. Drugs
   a. Epinephrine, 1:1000 1ml ampoule if administering botulinum toxin
   b. Atropine if administering edrophonium chloride

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17.0 Quality Assurance

17.1 A quality assurance program shall be in place to ensure that the minimal technical standards of the **Canadian Association of Electroneurophysiology Technologists (CAET)** and reporting standards of the **Canadian Society of Clinical Neurophysiologists** are met.

17.2 The content and format may be flexible, but the program at a minimum should monitor:

17.2.1 Structure

1. Staff Competency – Interpreters

   a. A mechanism shall be in place to provide feedback between the interpreter and technologist and that this be documented.
   b. A peer review process shall be in place for interpreting physicians to participate in the cross-reading of EMG cases annually and that this be documented.

2. Staff Competency - Technologists

   a. Technologists should be observed periodically by a peer or a qualified physician while performing studies and this shall be documented.
   b. Technologists should be given timely feedback on the quality of tracings by the interpreter and this shall be documented.
   c. There should be a formal review of technologists at regular intervals and this shall be documented at least annually.

3. Equipment Performance

   a. There should be a checklist for routine preventative maintenance to ensure proper and safe operation of neurophysiological testing equipment and all service and repairs shall be documented.

17.2.2 Process

1. Laboratory Technique and Procedure

   a. There should be a checklist for consistent technique and operation of the equipment in the event that staff who may be unfamiliar with the facility are called on to perform testing.

2. Reporting

   a. Facilities should monitor turnaround time and set targets for achievement.

3. Medical Records

   a. There should be a periodic review of the legibility and completeness of medical records.

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17.2.3 Outcome

1. Client Satisfaction

    a. Facilities should solicit feedback from patients and physicians using the facility on a regular basis regarding their satisfaction with the service.

2. Safety

    a. Facilities should maintain a distinct log of critical incidents, including the action taken to prevent future occurrences.

3. Utilization

    a. Medical Directors should provide educational feedback to referring physicians when indicated.

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Appendix A - Electromyography (EMG) Reports

Extracted from the "Minimum Standards for Electromyography in Canada" of the Canadian Society Of Clinical Neurophysiologists (CSCN)

The electromyography report should include the following information:

1. Identification of the patient.
2. Statement of the problem and the indication for the study.
3. Description of the findings, including actual values when necessary.
4. Statement of normality or abnormality of these findings.
5. Clinical correlation and diagnostic conclusions.
6. Signature of the electromyographer.

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Appendix B - Infection Control Guidelines for Neurophysiology Laboratories

All patients are considered to be potential sources of hepatitis B, hepatitis C, HIV, and other infectious organisms. Personnel having potential contact with sharps or blood are encouraged to be immunized against hepatitis B.

General Recommendations

1. Hands shall be washed immediately before and after procedures.

2. The use of gloves is mandatory when handling blood or sharps contaminated with blood in most clinical situations. This is particularly important when the worker's skin barrier is broken.

3. Gowns, goggles and masks should be available for special circumstances such as droplet infection and where aerosolization of blood is possible.

4. Prior to disinfection and sterilization, all instruments shall first be thoroughly cleaned to remove all organic matter (blood & tissue) and other residue.

   Note: Organic matter shields organisms from destruction and may inactivate some disinfectants.

Technique

- The cleaning process shall be carried out using appropriate protective apparel - gloves, masks, and gowns or aprons, if splashing is anticipated.
- The articles shall be washed in hot sudsy water with bottle- or special-brushes or scrubbers, keeping below the water line when possible, to reduce aerosolization.
- Care shall be taken to remove all organic matter as appropriate to the article, (e.g. ports and channels).

Definitions

- High-level disinfectants: 2% glutaraldehyde, 6% hydrogen peroxide, peracetic acid
- Intermediate to high-level disinfectants: Chlorine compounds
- Intermediate-level disinfectants: Alcohols, Iodophors
- Steam autoclaving: Adequate steam autoclaving requires 20 minutes at 15 PSI and 121°C. To ensure proper sterilization, controls shall be included with each run. A quality control program should be developed in consultation with an expert in Infection Control and performance records kept for 2 years.

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Electroencephalography and Evoked Potential Laboratory

1. Cup electrodes and Electro-caps:
   - Clean as described in the attached manufacturer's excerpt, and
   - **In cases of known or suspected bloodborne infectious disease or where broken skin or blood are present on the scalp, soak for a minimum of 10 minutes in a high-level disinfectant (such as 2% glutaraldehyde), and**
   - Rinse in hot water and allow to dry.

2. Headbox, paste tube, tape measure, marking pencil, stimulating electrode, ground bands:
   - Wipe with an intermediate or high-level disinfectant.

   Note: If the patient has a head wound: discard the tape and pencil.

3. Sandpaper or wooden sticks used for skin preparation:
   - Discard after use on each patient.

4. Blunt needles used for application of paste:
   - Clean as described above, and
   - Sterilize by steam autoclaving, and
   - Store in sterile wrapping.

   Note: If the patient has known or suspected Jakob-Creutzfeld Disease or other Prion disease, discard the needles in a puncture-proof container sent for incineration. Arrangements for incineration can be made through hospitals or biohazardous-waste disposal contractors.

Electromyography Laboratory

1. Needle electrodes:
   - Clean as described above, and
   - Soak in high-level disinfectant for 12-14 hours, rinse in sterile water, and allow to dry, or steam autoclave as described above, or gas sterilize, and
   - Store in sterile wrapping.

   Note: Soaking needles in glutaraldehyde solution does not damage Teflon sleeves but repeated soaking or sterilization may raise impedance at needle tips, making disposal necessary. Vortexing or strong agitation is recommended during chemical disinfection of needles with sleeves or channels.

   Note: If the patient has known or suspected Jakob-Creutzfeld Disease or other Prion disease, discard the needles in a puncture-proof container sent for incineration.

Needlestick Incidents

7. There must be a policy in place that references a Regionally approved protocol for management of needlestick injuries.

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