Learning Teleneurology Basics

A Case-Based Approach

Swathi Beladakere Ramaswamy
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Chapter 1
Tele-Neurology Curriculum: A Primer

Swathi Beladakere Ramaswamy and Raghav Govindarajan

Discussion

Neurology is a branch of clinical medicine that deals with patients with brain, spinal cord, nerves, and muscles disorders. Like any other medical specialty, diagnosing accurately is critical for management of patient [1]. Although the neurological system requires the most complicated examination in medicine, it is the patient history that is the key to making the neurological diagnosis [1]. Tele-neurology is the use of modern communication technology to enable neurology to be practiced when the doctor and patient are not present in the same place, and possibly not at the same time [1]. The emerging field of tele-neurology is delivering quality care to neurologic patients in increasingly numerous technologies and configurations [2]. However, formalized medical training has not caught up with this developing field, and there is a lack of formal education concentrating on the specific opportunities and challenges of tele-neurology [2].

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Tele-neurology requires specific knowledge and skills that the most common Accreditation Council for Graduate Medical Education (ACGME) milestones might not address [2]. In response, the American Academy of Neurology (AAN) Telemedicine Work Group [2] formed an education subgroup to develop a framework for a formal tele-neurology curriculum in residency programs [2].

Various modules have been suggested by the work group that would align with the next accreditation of ACGME and also has room to modify to suit individual needs [2]. Table 1.1

TABLE 1.1 Model curriculum and suggested evaluation of equivalencies

Timeline	Didactics	Type of evaluation
Module 1 (2 hours)	Technological aspects of tele-neurology, basic implementation, and limitations	Vignette-based multiple-choice questions and journal club
Module 2 (1 hours)	Licensure and medicolegal issues and ethics	Vignette-based multiple-choice questions and journal club
Module 3 (4 hours)	Provider–patient relationship, professionalism, and webside manners	Case-based simulations/objective structured clinical examination, 360° evaluation including tele-mentoring and journal club
Module 4 (1 hours)	Informed consent and patient privacy	Case-based simulations/objective structured clinical examination, 360° evaluation including tele-mentoring and journal club. Option of self-reflection essay on the future role of tele-neurology at the end of the training modules
Module 5 (4 hours)	History, examination, and documentation in tele-neurology	360° evaluation including tele-mentoring, objective structured clinical examination, and journal club

briefly outlines the various modules and their suggested evaluation of equivalencies.

A good foundation of technical knowledge is essential for safe and effective practice [2, 3]. Module 1 focuses on learning about different delivery models, technological basics, and artifacts in the interpretation of tele-neurologic data and reviewing commonly used terminology [2, 3]. The licensure and medicolegal considerations associated with the practice of tele-neurology vary from state to state and are continuously evolving [4]. Module 2 is all about approaching legal issues on a case-by-case basis with involvement of legal and regulatory advisors at the academic hospital [4]. Developing a provider–patient relationship is the key to a successful therapeutic alliance and forms the basis of the art of healing [5]. Overdependence on the technology must not compromise the provider–patient relationship [5].

Module 3 aims at teaching neurology residents the technique and challenges behind developing a provider–patient relationship [6]. A thorough understanding of Health Insurance Portability and Accountability Act and the Health Information Technology for Economic and Clinical Health Act should be observed and followed [7]. Module 4 is all about how neurologists must inform their patients of the security of personal data, including details on what information is being accessed and by whom [8], and disclose information (financial, professional, or personal) that could potentially bias their choices and influence a patient's understanding or use of the information, products, or services offered on tele-neurology websites [9]. The neurologic history and examination need to begin with the expectation from the provider that the patient will receive the same standard of care as with any other encounter [10]. Tele-neurology is effective for obtaining a complete neurologic history if the provider has clear communication and effective interpersonal skills [10].

Module 5 includes simulations to practice physical examination and certain standardized scores (Mini-Mental State Examination, NIH Stroke Scale, Expanded Disability Status Scale) [11] and familiarize with tele-neurology technology

like reviewing patient's records, moving cameras, etc. [12]. Currently, there are certain parts of neurological examination that is not appropriate for tele-neurologic consultation as mentioned in Table 1.2, but with evolving technology and diverse practice of telemedicine, some of these limitations may be overcome in the future [10]. Healthcare professionals, like a registered nurse, physician assistant, nurse practi-

TABLE 1.2 Degree of appropriateness for tele-neurological consultation

Appropriate	Difficult but possible	Likely not appropriate
Functional strength testing and sensory examination (spinothalamic tests and vibration with the help of a tele-presenter)	Detailed motor testing (reliant on the tele-presenter to determine tone and specific grades of Medical Research Council grading scale)	Comprehensive vestibular testing (given current peripheral devices in existence)
Cerebellar and gait testing (movement disorders physicians have been some of the earlier and most successful adopters of telemedicine)	Muscle stretch reflexes testing	Comprehensive neuro-ophthalmologic (without requisite peripherals)
Mental status examination including cognitive scales	Proprioception	Comprehensive neuromuscular examination
Cranial nerve examination (the funduscopic examination currently requires peripheral devices that are not always available)	Functional testing for positive psychogenic examination components	Brain death examination

tioner, telehealth technician, or referring physician, can play the role of tele-presenter who are co-located with the patient and help overcome some difficulties with virtual examination [10].

Once the modular training process is completed, it is important to have a method to evaluate the trainee and measure their performance [2]. Each residency can define their own objectives for the tele-neurology rotation and develop individualized milestones based on the content mentioned in each module [2]. The programs can define a minimum number of tele-neurology patients (both inpatient and outpatient) that each resident needs to evaluate, document, and log to achieve clinical competency [2]. The American Academy of Neurology (AAN) Telemedicine Work Group [2] has identified ways to evaluate the resident's proficiency in tele-neurology, which has been briefly described in Fig. 1.1.

The overall goal of any Neurology Clerkship program is to teach the principles and skills necessary to recognize and manage neurologic diseases a general medical practitioner is most likely to encounter in practice [2, 14]. This technology also allows to build a clerkship program that is virtual and helps the medical students to access the information from anywhere, at their convenience, and to have better audiovisual learning through video libraries, simulations, games, podcasts, virtual patient rounds, lectures, webinars, etc. [2, 14]. Social media can also be utilized, for example, Twitter rounds and Facebook webinars. It is possible to categorize these virtual platforms to clinical, nonclinical, independent learning, and peer teaching strategies [2, 14].

The resources that can be included for clinical strategies are clinic video libraries (neuro-examination, neuro-ophthalmology videos), AAN and global neurology conferences, comprehensive simulated patient encounters through i-Human and Medscape simulation portals, virtual patient rounds, and telemedicine clinical precepting [13, 14]. Nonclinical strategies include lectures, discussions, demonstrations, webinars, workshops, audio streaming media, podcasting, and games. For effective assimilation of knowledge

Direct supervision of the resident's tele-neurology history and examination skills.

Case simulation to assess webside manners.

Objective structured clinical evaluation of different teleneurology cases.

10-20 clinical vignettes with multiple-choice questions to assess resident's knowledge in technology, medicolegal issues, and professional/ethical standards.

Self-reflection essay on the future role of teleneurology in the trainee's practice or journal club discussion.

On teleneurology 360˚ evaluations (where attending, patients, peers, and allied health care professionals asses the residents and residents assess themselves as well as evaluate the rotation) are ideal for the improvement of teleneurolog rotations.

FIGURE 1.1 Methods to evaluate resident's proficiency in tele-neurology as per the American Academy of Neurology (AAN) Telemedicine Work Group

and understanding concepts, appropriate learning methods need to be inculcated in clerkship programs [13, 14]. One method may be superior/inferior to others based on the topic of discussion. Table 1.3 describes the various learning strategies that can be implemented in virtual clerkship programs.

This book is an attempt to shed light on various aspects of tele-neurology through simple case-based approach and to help students, residents, and physicians to adapt telemedicine

TABLE 1.3 Description of various learning strategies that can be implemented in virtual clerkship programs

Methods	Description
Self-directed learning	Learners taking the initiative for their own learning: diagnosing needs, formulating goals, identifying resources, implementing appropriate activities, and evaluating outcomes
Independent learning	Instructor- or mentor-guided learning activities to be performed by the learner outside of formal educational settings (classroom, lab, clinic)
Peer teaching	Mutual learning through topic presentations, discussion boards, journal clubs, conferences. May be "peer-to-peer" (same training level) or "near-peer" (higher-level learner teaching lower-level learner)
Case-based learning	Use of patient cases (actual or theoretical) to stimulate discussion, questioning, problem solving, and reasoning on issues pertaining to the basic sciences and clinical disciplines
Problem-based learning	Use of carefully selected and designed patient cases that demand from the learner acquisition of critical knowledge, problem-solving proficiency, self-directed learning strategies, and team participation skills as those needed in professional practice
Tutorial	Instruction provided to a learner or small group of learners by direct interaction with an instructor

approach in their practice. This book is arranged as clinical vignettes with tele-neurology approach and the advantages and disadvantages of such encounters. Each chapter then discusses one important aspect of tele-neurology in depth for better understanding.

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