Towards Competency-Based Medical Education in Neurostimulation

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Competence-based medical education (CBME) is an evolving contemporary model for postgraduate medical training. A core organizing principle is the use of competency-based rather than time-based criteria for promotion through the stages of training [1]. CBME originated first within the surgical specialties given evidence that amount of training, and volume of procedural experience might better predict complication rates than time spent in residency [2, 3]. This line of reasoning has led to more widespread adoption of the CBME paradigm in residency training programs.

In Canada, CBME, referred to as competency by design, has operationalized the use of Entrustable Professional Activities (EPAs) as the building blocks of CBME. Defined by the Association for Medical Education in Europe (AMEE) as “a unit of professional practice that can be fully entrusted to a trainee, as soon as he or she has demonstrated the necessary competence to execute the activity unsupervised” [4], each EPA is intended to reflect a core professional activity within a given specialty, one which a specialty graduate should be able to perform *competently* and *independently* upon completion of training. Thus, for an EPA to be effectively operationalized as a training objective, it must encompass a defined set of skills, tasks, and/or knowledge that as a whole can be assessed according to criteria broadly agreed upon by educators and clinicians in the specialty.

To facilitate this process, each EPA is divided into component milestones, each intended to reflect a discrete component of the professional activity and each capable of acquisition and assessment independent of the whole. Initially envisioned by the Accreditation Council for Graduate Medical Education as part of the Outcomes Project [5], milestones can both serve as a “roadmap” for professional development during residency and provide templates for assessment of individual skills and knowledge areas. Crucially, the assessment of a milestone

can occur in the course of clinical work and, therefore, is “reflective of what residents actually do” [3].

CBME: Challenges for Psychiatry

Given the prior establishment of a CBME framework in surgical specialties [3, 6], it is appealing to use these existing models as a template for psychiatry’s own transition to this framework. Two key challenges emerge, however. The first is a lack of clear comparability between discrete surgical tasks and psychiatric clinical skills, making a direct translation of the surgical CBME paradigm to psychiatry residency training impractical. The second is that, unlike surgical education literature, there is little evidence outlining a relationship between quality/volume of psychiatric training experiences and competency. Neurostimulation, first-line therapies for treatment-resistant depression, is an ideal case for adapting CBME to psychiatry training, given its procedural nature [7].

Experience with the CBME framework in psychiatry residency training is in relatively early stages, but designs have been proposed for emergency medicine [8], CBT [9], and mindfulness-based psychotherapy [10]. Furthermore, the incorporation of standardized exercises [11] and simulation activities [12] in the context of electroconvulsive therapy has previously been explored on a pilot basis. However, a framework for applying principles of CBME to neurostimulation modalities has not been formally proposed.

Rationale for a Neurostimulation EPA

Currently, mandated neurostimulation training in Canada for a graduating general psychiatry resident is limited to basic competence in ECT [13]. However, other neurostimulation modalities are emerging into the mainstream of psychiatric practice, in particular repetitive transcranial magnetic stimulation (rTMS), a modality which is approved by the FDA and provided in Europe, Asia, and Australia and which was approved

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by Health Canada in 2002. There is presently no formal framework for incorporating rTMS exposure or training in psychiatric residency. Furthermore, with the emergence of rTMS as a more mainstream psychiatric treatment alongside ECT, it is worth considering the utility of a concept such as “interventional psychiatry” to encapsulate the use of procedural treatments for psychiatric illness, as has been proposed by Williams et al. [14].

The degree of competence required of a graduating general psychiatrist in the field of neurostimulation is a valid subject of debate. It can be argued, for instance, that since not all psychiatrists will go on to be ECT practitioners, full competence in this procedure should not be defined as a formal outcome of training in the CBME framework. We disagree with this stance, for two reasons. First, ECT is a procedure practiced widely in Canada and the US [15, 16], and the use of rTMS is growing [14]. Therefore, it is likely that most, if not all, graduating psychiatrists will encounter one or both of these procedures either directly or indirectly during their careers. This underlines the need for formal, standardized training during residency, as accreditation standards to establish competency after graduation are inconsistent or even nonexistent in many use settings [14, 17]. It is for these reasons that the American Psychiatric Association Task Force on ECT strongly recommended adopting universal standards for ECT training and credentialing during residency training [16]. Second, it is worth recognizing that in many, if not all, other medical and surgical residencies, some skillsets and competencies required for completion of training will not be employed by all graduating residents: for example, general internal medicine residency training requires learning numerous vascular access and fluid management procedures which, while used regularly in practice by general internists, will not necessarily be required in the setting of outpatient-focused, subspecialty practices. This can be considered as a reflection of the wide diversity of professional career paths after graduation from postgraduate medical training, and the crucial need, nonetheless, to develop a common base of skills during specialty training, particularly those that are both widely practiced and uniquely suited to members of a particular specialty. We assert that ECT, as well as to an increasing degree rTMS, fits this description within the context of psychiatry’s contemporary scope of practice.

Developing an EPA for Neurostimulation

The initiative described in this article aims to establish an adaptable template for incorporating neurostimulation modalities into psychiatric residency training, while adhering to the current CBME framework. A working group was formed consisting of residents, academic faculty, and clinical faculty at the University of British Columbia with previous

experience in CBME curriculum development, ensuring our project adhered to the current standards of practice. A scoping review was conducted to identify existing literature regarding the development of early CBME initiatives, primarily with procedural specialties, as well as CBME initiatives specific to neurostimulation and psychiatry. The working group developed a proposed framework of a common EPA template and milestones, with the aim of their flexible application in various neurostimulation modalities.

Our group anticipated a need for distinction between neurostimulation milestones in general psychiatry training, compared with extra training for residents with a special interest in neurostimulation. Therefore, our proposed milestones for rTMS are subdivided between core and advanced skills, reflecting its evolving role in psychiatric training and practice. The initial findings of our working group were presented at the International Brain Stimulation conference for feedback from local, national, and international collaborators. This feedback was then used to further refine the proposed EPA.

The design of our proposed EPA has been guided by the following principles: *clarity* of language outlining a particular clinical skill, *applicability* of each milestone to a recognizable and demonstrable skill, task, or unit of knowledge, *reliability* of evaluation of each milestone and sub-milestone within a given EPA, and *validity* with each component reflecting skills and best practice within modern psychiatric practice.

Table 1 outlines the proposed neurostimulation EPA and respective milestones. The milestones outlined are linked to the respective neurostimulation modalities, ECT and rTMS. With respect to rTMS, we propose a distinction between milestones that are “core” and those that are for “advanced practice,” related to the anticipated difference in competency needs for a general psychiatrist as compared with a resident with special interest in neurostimulation. “Core” milestones reflect objectives that are expected to be achieved by all residents, whereas “advanced practice” milestones reflect optional added competencies for individuals who choose to dedicate further time, in the context of electives or fellowships, towards achieving proficiency as a rTMS practitioner.

Integrating Neurostimulation into CBME

While there is a mandate that all postgraduate programs adopt CBME, many programs have yet to introduce CBME in practice. Within psychiatry, the field of neurostimulation, a procedure-focused domain, lends itself well to being modeled from competency-based educational design. While ECT has been identified previously as a core aspect of training, it is likely that new neurostimulation modalities will continue to emerge and grow. At present, rTMS is quickly becoming a core modality in psychiatry having recently been recognized as a first-line modality for treatment-resistant depression.

Table 1 Neurostimulation EPA and milestones.

EPA: Integrate the principles and skills of neurostimulation into patient care		
Milestones: ECT		Milestones: TMS
Core Training	Use communication skills and strategies that help the patient and family make informed decisions regarding their health	Core Training
	Work with patients and their families to decrease stigma regarding neurostimulation treatments	
	Obtain and document informed consent, explaining the risks and benefits of, and rationale for neurostimulation	
	Be able to refer patients for neurostimulation when appropriate.	
	Conduct appropriate preparations for a patient undergoing neurostimulation	Advanced Practice
	Plan a course of neurostimulation	
	Apply neurostimulation using appropriate techniques	
	Document procedures accurately	
	Establish and implement a plan for post-procedure care	
	Assess patient response to treatment as indicated	

Outline of proposed milestones comprising the consensus EPA developed by our working group

The EPA for ECT is proposed to contain all above milestones for completion of standard psychiatry residency training (core training). For TMS, competencies related to delivery of the treatment itself are proposed as advanced practice milestones (i.e., not part of core residency training). This is in recognition that, in current practice, this skillset is not essential for all general psychiatry graduates

Moreover, it has increasingly becoming covered publicly and/or by a variety of private insurance providers [7]. At the same time, in our framework, we differentiate between the milestones for rTMS, identifying many of the specific procedural elements of rTMS as outside the scope of core milestones due to constraints in local availability of this procedure.

The distinction between “core” and “advanced practice” milestones is likely relevant to many other areas within psychiatry and is also dependent on the specific institution and their resources. Conversely, failing to integrate emerging

neurostimulation treatments into psychiatric training may limit expertise and accessibility. This challenge may result in use of these modalities without demonstrated competence. Proactive inclusion of basic rTMS training within psychiatric residency is critical to plan for future practice needs within our specialty. Similarly, while ECT is already a core aspect of residency training, credentialing for ECT varies from institution to institution. Developing EPAs for neurostimulation for modalities like ECT and rTMS allows for greater standardization of practice. More than other areas in psychiatry,

neurostimulation portends to be an ever-evolving field which will require medical educators to continue reviewing training milestones as technology races ahead.

Conclusions

The increasing evidence base and growing number of clinical indications have led to the rapid integration of neurostimulation into psychiatric practice. While postgraduate psychiatric programs have begun to transition to CBME, there has been little focus on neurostimulation. As a procedural based area of practice, neurostimulation is well suited to CBME and, as a result, is a compelling area of focus for postgraduate programs to begin implementation with, as part of an initial transition to CBME. The outlined neurostimulation EPAs and milestones may be of tremendous importance to postgraduate psychiatry programs as they shift to CBME.

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Compliance with Ethical Standards

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