

An Interventional Psychiatry Track

Joshua C. Brown, M.D., Ph.D.

"Interventional psychiatry" has been proposed as a name for the emerging psychiatric subspecialty of neuromodulation, or brain stimulation. The practices of electroconvulsive therapy and transcranial magnetic stimulation are rapidly expanding. Moreover, research techniques, such as neuro-navigation and electrophysiology, are already translating to the clinic, further emphasizing the need for training paradigms to keep pace. The purpose of this article is to provide practical guidance for psychiatry residents who seek further training in this emerging subspecialty. It describes a training track developed at the Medical University of South Carolina that can be adopted by residents at other institutions.

In 2014, Williams and colleagues (1) proposed "interventional psychiatry" as a psychiatric subspecialty analogous to other procedural-based subspecialties such as interventional cardiology, neurology, and radiology (2) as a way to describe the practice of ECT, transcranial magnetic stimulation (TMS), and other forms of brain stimulation. The rationale for a new subspecialty, and for training in interventional psychiatry, is beyond the scope of this article but has been described previously (1, 3).

The goal of this article is to provide direction to the resident seeking training in brain stimulation based on a track we have formulated at the Medical University of South Carolina (MUSC) under the direction of our interventional psychiatrists. It is based on principles described by Williams and others (1, 3). The curriculum is designed to provide necessary training experiences to develop expertise in this emerging field. We also hope it will be a step toward operationalizing

an interventional psychiatry track formally recognized by the Accreditation Council for Graduate Medical Education (ACGME). This curriculum should be adapted to individual residents on the basis of their interests and the interventional training opportunities available to them, and it can be integrated into the current framework of ACGME residency requirements.

WHY A TRACK?

Until fellowships are more broadly available, a residency track allows flexibility based on the available supervision, patient volume, and access to interventional psychiatry procedures. It can also be tailored toward individual interests and goals. Even if a track is not formally acknowledged by a resident's program, the resident can individualize his or her training through elective brain stimulation rotations.

An ideal training experience may also incorporate advanced functional neuroimaging, neurophysiology, research, and both invasive and noninvasive brain stimulation as described previously (1). However, it may not be practical for some residents to incorporate all components into their residency. The proposed track described herein has been distilled down to five full-time equivalents (FTEs) that we feel are sufficient to achieve expertise in interventional psychiatry (Figure 1).

CORE CURRICULUM AND GOALS

Elective block month (1 FTE): Composed of half-day ECT and half-day TMS intermixed with occasional consults. The goal of this rotation is to gain exposure and familiarity with the procedures, an appreciation for the rationale and evidence behind

clinical decisions, and an understanding of indications and contraindications for interventional treatments. Residents typically advance to administer the treatments under direct supervision.

This 1-month block is considered an elective because it includes a large proportion of inpatient procedures and is not longitudinal. By contrast, the FTEs of TMS and ECT and the two FTEs of consults are longitudinal over the third and fourth year. These longitudinal rotations may qualify toward ACGME outpatient requirements when considering the ACGME objectives: "Resident experience in outpatient psychiatry must include 12 months FTE of organized, continuous, and supervised clinical experience...in multiple treatment modalities that emphasize developmental, biological, psychological, and social approaches to outpatient treatment" (4).

ECT (1 FTE): Advancing on the practical skills learned during the 1-month block course, residents engaged in this 1-year, half-day-per-week, (or equivalent) longitudinal patient exposure would progress into greater involvement in long-term decision making. Experience with management of patients receiving both maintenance and acute treatment series is ideal. The goals of this rotation are to gain skills in the following areas: supervising trainees in ECT administration (typically fourth-year medical students and junior residents), reading EEG and EMG to determine seizure occurrence and duration to guide dosing, counseling patients and families, treating adverse effects, documentation, determining cessation or alteration of treatment, and gaining supervised exposure to unexpected occurrences.

FIGURE 1. Sample interventional psychiatry track (IPT) schedule^a

PGY- 1 (0 FTE)			Monthly blocks (1 FTE per month)											
			Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
	Half-day equivalents (1 FTE per half day for 1 year)	Mon AM	Core medicine/neurology and psychiatry rotations											
		Mon PM												
		Tues AM												
		Tues PM												
		Wed AM												
		Wed PM												
		Thurs AM												
		Thurs PM												
Fri AM														
Fri PM														
Didactics		· Optional nonthly lecture and supervision · Optional monthly brain stimulation lab journal club (clinicians and scientists)												
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Half-day equivalents (1 FTE per half day for 1 year)	Mon AM	IPT rotation (1 month)	Core neurology and psychiatry rotations											
	Mon PM													
	Tues AM													
	Tues PM													
	Wed AM													
	Wed PM													
	Thurs AM													
	Thurs PM													
	Fri AM													
Fri PM														
Didactics		· 75% attendance - monthly lecture and supervision · Monthly brain stimulation lab journal club (clinicians and scientists) · 1 journal club presentation												
PGY- 3 (2 FTEs)			Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
	Half-day equivalents (1 FTE per half day for 1 year)	Mon AM	IPT consults											
		Mon PM	ECT											
		Tues AM	Core psychiatry rotations											
		Tues PM												
		Wed AM												
		Wed PM												
		Thurs AM												
		Thurs PM												
		Fri AM												
Fri PM														
Didactics		· 75% attendance - monthly lecture and supervision · Monthly brain stimulation lab journal club (clinicians and scientists) · 1 journal club presentation · Present IPT lecture to junior residents												
PGY- 4 (2 FTEs)			Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
	Half-day equivalents (1 FTE per half day for 1 year)	Mon AM	IPT consults											
		Mon PM	TMS											
		Tues AM	Elective (i.e., deep brain stimulation programming in movement clinic)						Elective (i.e., headache clinic with brain stimulation)					
		Tues PM	Elective (i.e., EEG)						Elective (i.e., advanced neuroimaging)					
		Wed AM	Core psychiatry rotations											
		Wed PM												
		Thurs AM												
		Thurs PM												
		Fri AM												
Fri PM														
Didactics		· 75% attendance - monthly lecture and supervision · Monthly brain stimulation lab journal club (clinicians and scientists) · 1 journal club presentation · Present IPT lecture to junior residents												

^a The schedule is based on the first 2 years of rotations as monthly blocks (columns; row lettering grayed out) and the last 2 years of rotations as 6-month blocks of half-days per week (rows; column lettering grayed out). Shaded boxes indicate core residency requirements not involving brain stimulation. Nonshaded boxes represent part of the IPT. (Didactic goals and expectations are listed separately below their respective year.) FTE=full-time equivalents, IPT=interpersonal psychotherapy, TMS=transcranial magnetic stimulation.

TMS (1 FTE): Similar to ECT, this longitudinal 1 FTE course builds off of the 1-month block course. Emphasis is placed on learning to find motor thresholds (individualized location and “dose” of stimulation), ideally on different makes of TMS machines; managing adverse effects; counseling patients with safety and efficacy evidence; and documentation.

Consults (2 FTE): Perhaps the greatest learning curve in interventional psychiatry is in the initial consultation. For this reason, 2 years of one-half day per week are dedicated to gaining this supervised experience. Goals of this rotation include the following: thorough familiarity with indications and contraindications of each modality, knowledge of screening and safety measures involved, understanding of insurance coverage limitations and challenges (and how to navigate them), an ability to implement evidence supporting interventional methods to wide-ranging clinical scenarios, and an ability to communicate about the limitations and advantages of each modality with patients.

RESOURCES AND PATIENT VOLUME

As a context for the rotations described above, I will first describe our clinical brain stimulation service within the Department of Psychiatry at MUSC. We have three full-time clinicians and two clinician-scientists in the Brain Stimulation Division. They rotate regularly to cover three services: a satellite location with outpatient brain stimulation consults in the morning and TMS in the afternoon with two machines (administering TMS on one and supervising an RN on the other); a service on campus covering ECT in the morning, while supervising TMS administered by an RN in the adjacent room, and outpatient brain stimulation consults in the afternoon; and a service covering a general adult inpatient psychiatry unit, which also covers inpatient brain stimulation consults.

ECT is performed on an average of ten to 15 patients daily. Monday, Wednesday, and Friday are for acute treatment courses. Tuesday and Thursday are for

Proposed monthly lecture topics	
Core topics	
ECT	History and legislation Consult, indications, electrode placement Electricity, stimulus, dosing, EEGs Anesthesia, medical emergencies, side effects in the elderly
Transcranial magnetic stimulation	History perspective Neurophysiology and depression treatment Theory and mechanics of motor threshold Location for stimulation Safety, placement/parameters—experimental
Elective topics	
Vagal nerve stimulation history, indications, neuroanatomy, physics, programming	Deep brain stimulation history, indications, neuroanatomy, physics, programming Advanced imaging primer for interventional psychiatrists Neurophysiology primer for interventional psychiatrists Ethics of brain stimulation Experimental techniques in brain stimulation

maintenance ECT patients. Afternoon consults include two patients scheduled for 2 hours each on Monday and Tuesday. TMS is performed on an average of 20 patients daily between three machines.

ELECTIVES

The core curriculum is designed to produce expertise sufficient to practice safely and effectively as an interventional psychiatrist. However, additional training may be desired either to obtain the level of mastery described by Williams and colleagues (1), including an understanding of circuit-based neurobiology, neuroanatomy, and physics through advanced functional neuroimaging and neurophysiology rotations, or to develop expertise in managing more invasive forms of brain stimulation, such

as deep brain stimulation (DBS) or vagal nerve stimulation (VNS). In addition, research electives can provide helpful exposure to investigational forms of brain stimulation, such as transcranial direct (or alternating) current stimulation or transauricular VNS among others, which hold promise to enter clinical practice (5).

Other electives may include additional neurology rotations. Patient volume in invasive modalities, such as DBS and VNS, is very limited for psychiatric indications: DBS is FDA-approved only for obsessive-compulsive disorder as a humanitarian device exemption resulting from a randomized controlled trial with 26 participants (6), and VNS is FDA-approved only for depression but is not currently covered by any insurance policies. Rotations through movement and epilepsy clinics dedicated to

Key Points/Clinical Pearls

- The subspecialty of “interventional psychiatry” has been proposed to describe the practice of ECT, transcranial magnetic stimulation, and other forms of brain stimulation.
- There is a need for formal recognition of interventional psychiatry as a subspecialty and for operationalized training programs in this rapidly emerging field.
- An important goal for the interventional psychiatrist is understanding how to critically appraise the literature, which is constantly evolving in this cutting-edge field.

DBS and VNS, respectively, can provide necessary programming experience and familiarity with surgical implantation of DBS stimulators on awake patients (Figure 1). Additional brain stimulation experience may be obtained in treating other neurologic conditions. Figure 1 includes, as an example, details of our refractory headache clinic, where we counsel, advise on, and prescribe FDA-approved TMS and noninvasive cervical VNS treatments (these treatments are carried out by the patient at home, which may represent one future direction of clinical brain stimulation). Indeed, the interventional psychiatrist is likely to be consulted by other specialists for advice or assistance as new neuropsychiatric indications are approved for brain stimulation treatments.

DIDACTICS

Didactics are an important part of interventional psychiatry training (1). Goals may include exposure to uncommon clinical scenarios; less commonly used modalities; a background in the underlying physics of the devices, neuroanatomy, and neurocircuitry; and current evidence to understand the limitations of these treatments. These objectives can be accomplished in two primary ways: regular (i.e. monthly) group supervision in which learning cases can be discussed and regular (i.e. monthly) lectures on a variety of topics taught by those with expertise (see box).

Another important goal for the interventional psychiatrist is understanding

how to critically appraise the literature, which is constantly evolving in this cutting-edge field. This can be accomplished through a regular (i.e. monthly) journal club, ideally with both clinicians and scientists (Figure 1). Finally, giving lectures to junior residents can enhance knowledge of and communication about interventional psychiatry (see also Williams et al. [1] for how didactics fit into the ACGME psychiatry milestone project).

CONCLUSIONS

The aim of this article was to provide practical ideas for interested psychiatry residents to gain expertise in clinical brain stimulation, building on the rationale set forth previously (1, 3). We considered the core curriculum set forth as sufficient to gain expertise in interventional psychiatry, with additional electives necessary for obtaining a mastery of the field. It is anticipated that these principles will be adapted to the resources available at a particular training institution, as well as to the resident's specific interests and goals. This article also highlighted the increasing need for formal recognition of interventional psychiatry as a subspecialty and the need for formalized and operationalized training programs in this rapidly emerging field.

Dr. Brown is a sixth-year resident in the Department of Neurology and the Department of Psychiatry and Behavioral Sciences, Medical University of South Carolina, Charleston.

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