Provider Note:

The Economics of IONM Expertise: When Supply Falls Short of Demand

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A paper recently published in the Canadian Journal of Surgery summarizes the results of a survey in which Canadian surgeons were asked about qualification for supervision and interpretation of IONM (Norton *et al*., 2015a). Because surgeons' opinions on the professional practice of IONM are discussed, it reminded me of a paper by Dormans (2010). Among the questions posed to Spine, Neurosurgery, cardiovascular and Otologist surgeons were: who *currently* interprets your IONM data, and who would you *prefer* to interpret the data, if you had a choice (Norton *et al*., 2015b). The study was conducted for two reasons. First, the demand for IONM in Canada has out-paced the supply of personnel with the appropriate training and expertise to interpret the data. Second, there is a push from technologists to interpret IONM data, and this has been presented as the solution to the staffing problem. So, the authors thought it would be prudent to ask surgeons what *they* would prefer.

When the results of the survey were analyzed, several interesting statistical findings emerged (Table 1). First, across the survey respondents the majority is currently interpreting their own IONM data; however, if they had their druthers, most would prefer not to. Indeed, cardiovascular surgeons were the only group who exhibited any preference for interpreting their own IONM data (83%). Second, when given the option to choose who they would prefer to interpret their data, the other surgical specialties chose PhD Neurophysiologist (92.7%), neurologist (74.3%), self (9%) and MSc-Tech/Tech-NOS (0%).

Table 1: Surgeons' views on the qualifications of individuals interpreting IOM data (Adapted from Norton *et al*., 2015a)

	Group, %			
Qualification	Spine Surgeons	Neurosurgeons	Cardiovascular Surgeons	Otolaryngologists
Current				
Tech	51	38	0	18
MSc Tech	9	11	0	7
Self (surgeon)	63	78	85	72
Neurology	21	15	3	11
PhD Neurophysiologist	21	26	9	34
Desired				
Tech	0	0	0	0
MSc Tech	0	0	0	0
Self (surgeon)	15	5	83	7
Neurology	75	63	23	85
PhD Neurophysiologist	95	92	29	91

With 227 responses obtained from members representing 4 specialties and 5 professional societies (Norton et al., 2015a), the authors believe that they've captured around 50% of those surgeons in Canada who use IONM (Personal Communication). From these data, the authors draw no specific conclusions, aside from acknowledging that the axiomatic predicament of IONM – demand outpaces supply – has now become a problem for Canada.

In an effort to understand how IONM works in Canada, I contacted several Canadian providers to inquire. This is what I learned from my sources:

- Staffing: surgeons accept whatever resource they can get because IONM personnel, regardless of qualification, are a scarce commodity.
- Technologists: can perform IONM and there's no law stating they need to be supervised.
- Outsourced Solutions: There are few, if any, private IONM companies in Canada, so technologists tend to work for hospitals, who accept the overhead for the service to provide the best economic solution for their patients.
- Automated Monitoring Devices: are available in some centers, but surgeons are wary due to known safety concerns as published in US literature (e.g., Nuwer, 2011).
- PhD Neurophysiologists: can supervise and interpret IONM in a capacity equal that of Neurologists.
- Neurologists: As there tends not to be a fee code specific to IONM, there is a tendency for Neurologists to 'monitor' whilst performing other activities, such as seeing patients in clinic.

These last two observations may explain why surgeons are split (95% for Ph.D. Neurophysiologists and 74.3% for Neurologists) in provider preference, but clearly they desire to replant the responsibility of the interpretation of IONM data. While I was unable to validate compensation/reimbursement arrangements of governmental programs in Canada, generally, physicians and PhD neurophysiologist providers are compensated on a similar scale. Comparable arrangements are known to exist in Europe and Middle East.

The model for how IONM is currently practiced in Canada is very similar to the model that dominated in the US for the first three decades. It worked well in the days when appropriately-trained practitioners were scarce and demand for IONM was low. Then, demand for IONM services suddenly grew exponentially, but the availability of expertise remained constant. Any student of economics will tell you that when demand for a commodity rises on constant supply, price for the commodity usually rises, until such point that the supply can meet demand. IONM deviated from this expectation as a result of several factors that significantly impacted the field.

The barriers to entry for IONM include 1) the cost of technology, 2) regulation through medical licensure, and 3) demand for one-to-one provider/technologist-to-patient interface. The advent of internet connectivity enabled a telemedicine solution in which one physician performs supervision and interpretation of IONM for multiple patients simultaneously from a remote location. Because telemedicine allowed physicians to monitor and bill concurrently, the field suddenly became very profitable. Large practices and corporations entered the market and substantiated the "tech in the OR supervised by a remote physician" model to the point where it became the new standard of practice as annual IONM volumes continued to grow substantially. Today, approximately 80-85% of cases are monitored remotely.

Two additional factors have influenced IONM's market shift. First, with respect to case volumes, the rate of growth has slowed significantly over the last 5 years as IONM has become a standard of practice for many spine, brain and cranial nerve cases. Second, reimbursement for IONM service has declined significantly, both of the technical and professional services. For example, the AMA CPT never included a technical component for billing codes 95940 or 95941, which has contributed to the estimated $115.8 million in lost reimbursement. Furthermore, CMS' implementation of G0453 and the bundling of payments to providers continue to significantly impact the economics of IONM. All of these factors contribute to current state of affairs, which can be described as an ongoing decline in the availability of IONM expertise in the face of expanding demand. For the benefit of our field, for the benefit of our patients, and even for the benefit of international providers, the problems are worth a closer look.

The physician shortage problem is a known crisis throughout medicine, not just neurology. As it relates to IONM, the estimated supply of active neurologists in the US was 16,366 in 2012, and is projected to increase to 18,060 by 2025 (Dall *et al.*, 2013). Meanwhile, the demand for neurologists is projected to increase from18,180 in 2012 (11% shortfall) to 21,440 by 2025 (19% shortfall). In the face of a known shortage of neurologists in general, the number of neurologists supervising and interpreting IONM, in particular, decreased from ~2000 to ~1300 (35%) over a recent 10-year period (Nuwer *et al*., 2013). During that same timeframe, the volume of IONM cases exhibited a 15-fold increase (Nuwer *et al*., 2013). According to industry experts, the total volume of IONM cases

per year in the USA today is in the ballpark of 700,000. As Sala and Di Rocci (2015) put it, "…at present the real challenge in the field of IONM is the highly unfavorable ratio between demand and offer. Many neurosurgical centers advocate for the routine use of IONM, but there is not enough man power—in terms of expertise—to cover for such demand." Simply put, we don't have the capacity to sustain our current system in which physicians are the sole providers of IONM supervision, despite the slowly growing number of Neurologist entering the telemedicine/IONM subspecialty.

The physician shortage and the economic environment, ultimately brings forth the ostensible third rail in the field of IONM, which is the topic of who is qualified to supervise and interpret IONM. While the recent, practice guidelines for IONM published by ASNM addresses the issue (Skinner et al, 2014), the topic remains politically charged and difficult to approach, particularly for those non-physician doctorate-level providers (licensed or un-licensed). By and large, there are two camps. Camp 1 is composed of physicians who assert that IONM is the practice of medicine and therefore requires a medical degree. This camp has been the primary resource of IONM providership since the AMA House of Delegates resolved that IONM supervision and interpretation "constitutes the practice of medicine" (American Medical Association House of Delegates, 2008). Camp 2 is composed of non-physician doctors who assert that IONM is not the practice of medicine (i.e., limited to physicians), but requires a biomedical doctoral degree. Encouragingly, both camps agree that education, training and professional board certification are vitally important. For individuals not entrenched within either camp, and particularly those new to the field of IONM, the polarity is concerning and alternatives are refreshing.

I propose moving the field in a more positive and pluralistic direction by supporting the following:

- An academic infrastructure that will meet the demand for IONM professionals by establishing and affirming the doctoral training programs (both PhD and MD) in clinical neurophysiology, programs that include clinical rotations in the OR.
- Educational institutes should establish bachelorette-level training programs that will ultimately supply this field with a technical workforce that is well-educated and appropriately-trained.
- States establish license and expand the scope of practice to include providers and technologists with appropriate academic credentials and board certifications.
- Reimbursement from governmental payers and private payers to match the level and scope of IONM professionals.

Ultimately, these efforts need to be encouraged and supported by medical societies, professional IONM societies, surgical societies and others with power and influence under a uniform agreement.

In the meantime, there are number of short-term options that could potentially enhance the level of patient care and increase the supply of IONM provider.

- Encourage Board certification by either ABNM or ACNS for physicians and non-physician doctorate-level IONM providers as a standard for state licensure.
- Encourage state licensure of technologists (as already underway in Texas, Ohio and California).
- Invite the multitude of underemployed neuroscience PhDs to seek careers as IONM professionals. Many are stuck in low-paying postdoctoral positions and unlikely to ever achieve an independent career in academia (Johnson, 2014; Sheril, 2014; Boston Globe Editorial, 2014).
- Support qualified, doctorate-level professionals to practice independently as they achieve board certification (Skinner, 2014).

These steps are suggested to enable non-physician doctorate-level professional to enter the field of IONM and not envision the action as a step down in their career. Through appropriate training, testing and licensure, this will be a positive solution to the problem of supply and demand, and may work well for countries such as Canada!

Clearly, to support advancing patient care and the IONM profession there is an overwhelming need for expanding the skills, capabilities and expertise offered from a diverse profession; however, achieving this lofty

expectation will require leadership and cooperation of the invested parties. With transparent communication, and unity of purpose, the challenges can be overcome to meet the demands and best care models for patient outcome.

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