

Unveiling the Unseen: Building a Neurogastroenterology Unit – Current Challenges in Clinical Practice

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ABSTRACT

Neurogastroenterology disorders, also known as “Disorders of Gut-Brain Interaction” are gastrointestinal disorders that comprise a wide range of symptoms such as dysphagia, chest pain, heartburn, abdominal pain, nausea and vomiting, bloating, constipation, diarrhea or stool discharge. Scarcity of recognition, knowledge and training leading to the underdiagnosis of these conditions is associated with increased referrals to gastroenterologists or emergency room visits, along with a dramatic rise in healthcare costs and impaired quality of life. Despite advances in endoscopy and radiology, motility and pH impedance procedures remain the cornerstone of an accurate “Disorders of Gut-Brain Interaction” diagnosis, but these procedures need to be performed by well-trained personnel in a dedicated motility unit, with high-performance equipment. The primary motility procedures include high-resolution esophageal manometry and pH monitoring for esophageal function, high-resolution anorectal manometry and balloon expulsion tests for anorectal function, as well as hydrogen/methane breath tests for identifying dysbiosis and food intolerances. The purpose of this article is to highlight the importance of establishing a Neurogastroenterology and Motility Unit, and to provide an up-to-date overview on the main issues encountered when setting up a motility laboratory in the community or academic practice, including considerations for personnel training, equipment, and commonly performed motility procedures and their clinical usefulness.

Key words: neurogastroenterology – esophageal high-resolution manometry – motility unit – functional gastrointestinal disorders – motility training.

Abbreviations: ANMS: American Neurogastroenterology and Motility Society; DGBI: disorders of gut-brain interaction; ESNM: European Society of Neurogastroenterology and Motility; IBS: irritable bowel syndrome.

INTRODUCTION

Functional gastrointestinal disorders, also known as “disorders of gut-brain interaction” (DGBI), represent prevalent diagnoses within the digestive field, contributing substantially to worldwide morbidity [1]. Functional disorders encompass a wide range of symptoms, such as dysphagia, chest pain, heartburn, abdominal pain, nausea or vomiting, bloating, constipation, diarrhea and stool discharge. A comprehensive international study carried out by the Rome Foundation revealed that over

40% of individuals globally suffer from functional digestive disorders, with a major impact on both their quality of life and healthcare utilization [1]. Despite their high prevalence, the lack of proper diagnosis and effective treatment options has compelled a significant percentage of patients, ranging from 23.6% to 44.0%, to turn to complementary and alternative medical care for relief [2-4].

Although significant advancements have been made in endoscopy and imaging techniques, which provide valuable insights into various gastrointestinal diseases, these tools often fall short in addressing functional disorders. These patients often present normal results in these conventional tests, leaving their symptoms unexplained and their distress heightened. The persistence of these unresolved symptoms, without a clear diagnosis, has significant consequences; this often results in patients seeking multiple medical opinions, frequent emergency room visits, and subsequent overall increase in healthcare expenses [5-7]. In addition to contributing significantly to the financial burden, DGBIs

also have a notable impact on the quality of life. For example, individuals suffering from irritable bowel syndrome (IBS) express significant disruptions in health status, ranging from moderate to severe, and are willing to undertake substantial risks to achieve relief from their symptoms [8].

The intricate bidirectional interplay between the nervous system and gastrointestinal tract gives rise to a spectrum of disorders that often elude conventional diagnostic assessment, posing a considerable clinical challenge. Even with progress made in endoscopy and radiology, an accurate diagnosis of DGBIs is still based on motility and physiology testing. However, it is critical that these procedures are carried out by expert professionals in a dedicated motility unit, equipped with all the necessary high-performance tools.

Despite its undeniable relevance in clinical practice, it is currently facing major obstacles such as limited recognition, lack of dedicated training, and insufficient funding. In addition to highlighting the most important aspects of the epidemiology of DGBIs, this paper aims to raise awareness about the importance of establishing a gastrointestinal motility laboratory and to emphasize the main challenges, such as the need for dedicated physical space, personnel training, equipment, procedures and clinical care.

BUILDING A NEUROGASTROENTEROLOGY UNIT

The Rationale for Developing a Gastrointestinal Motility Lab

Establishing specialized gastrointestinal motility labs is an indispensable necessity in the clinical management of motility disorders. These facilities play an essential part in conducting advanced diagnostic procedures, which are vital for making the often-subtle distinctions between functional and organic gastrointestinal conditions. Data collected by the American Neurogastroenterology and Motility Society (ANMS) laboratory registry reported the presence of over 120 gastrointestinal laboratories across the United States in 2019 [9, 10]. In Romania, there are currently only a few centers dedicated to the evaluation of motility disorders. This gap in our infrastructure demands attention to address the unmet needs of patients with complex motility issues. Functional disorders often present with nonspecific symptoms that cannot clearly distinguish between motility and organic diseases. Therefore, relying exclusively on clinical symptoms can lead to misdiagnosis or delays in diagnosis, which can have significantly impact patient outcomes.

Esophageal function tests, including high-resolution esophageal manometry and esophageal pH-impedance monitoring, are important diagnostic tools in the evaluation of esophageal motility and acid exposure. These tests are particularly useful for the positive diagnosis of gastroesophageal reflux disease, for the evaluation of motility disorders, and for the preoperative assessment of conditions such as achalasia, to tailor the therapeutic intervention. Furthermore, they are essential prior to anti-reflux surgery to rule out esophageal motility disorders and to help determine the most appropriate therapeutic approach.

Anorectal function tests such as high-resolution anorectal manometry and balloon expulsion tests are procedures used

for assessing the anorectal and pelvic floor sensorimotor function. These tools can offer insights into various causes of chronic constipation, fecal incontinence, anorectal pain and other pelvic floor disorders. These investigations are especially useful considering the high prevalence of chronic constipation, with dyssynergic defecation being the main cause in up to 59% of patients [11, 12]. By making appropriate use of these investigations, a more precise diagnosis can be achieved, which in turn facilitates the implementation of targeted therapeutic strategies such as pelvic floor biofeedback therapy or physical rehabilitation. A motility lab can also serve as a hub for clinical research, facilitating collaborations with academic institutions and healthcare providers. This promotes the advancement of medical knowledge, the training and development of healthcare professionals, and active participation in international research initiatives.

Considering the impact of ascertaining an accurate diagnosis and providing tailored management on patient quality of life, the establishment of gastrointestinal motility labs should be regarded as a priority within healthcare systems. These facilities bridge critical gaps in clinical care and facilitate personalized treatment approaches for the management of these complex digestive conditions.

The Mainstays of a Motility Unit

When establishing a Neurogastroenterology unit, the main principles involve configuring a designated room for procedures with a secure space for storing equipment, as well as preparing and training a dedicated team, consisting primarily of a physician and specialized nurse. In addition to that, one should also coordinate the reimbursement process through the national health insurance system and address the billing process [13, 14]. The equipment required for a motility laboratory often depends on the specific interests of the gastroenterologists, as well as the institution's willingness to invest in such tools. At a minimum, a motility unit should include one dedicated room equipped with instruments designed to perform fundamental procedures such as esophageal manometry, esophageal pH testing, anorectal manometry and hydrogen breath testing (Table I) [15, 16]. Nonetheless, along with the minimal requirements of equipment and consumables, a motility unit

Table I. Standard procedures performed in a GI motility lab

| Procedure | Indication |
|---|--|
| Esophageal high-resolution (impedance) manometry | Dysphagia GERD Chest pain Pre/post-surgery |
| Esophageal pH and impedance monitoring | GERD Chest pain Heartburn Pre/post-surgery |
| Anorectal manometry (including rectal sensation/ tone/compliance) | Constipation Fecal incontinence Anorectal pain Pre/post-surgery |
| Hydrogen/methane breath test | Carbohydrate intolerance SIBO |

GERD: gastroesophageal reflux disease; SIBO: small intestinal bacterial overgrowth.

must include at least one physician and one dedicated assistant to perform, interpret and report results. Equally important for the sustainability of a motility unit is the implementation of an effective scheduling plan, which should account for procedural time, probe reprocessing, and the time required for result interpretation.

Space Configuration

Organizing a dedicated physical space for a motility unit requires careful planning to ensure functionality, accessibility, efficiency, patient safety, and comfort. The design should facilitate smooth workflow, enhance collaboration among medical staff, and accommodate specialized motility equipment. The allocation of a dedicated space for the Neurogastroenterology unit is contingent upon the existing infrastructure, the specific needs and resources of the institution, and the available budget [13]. In some cases, it may be feasible to integrate the Neurogastroenterology unit within the endoscopy laboratory. The designated space should allow safe storage of the motility equipment, provide medical record storage, a medical office desk, an area for clinical examination and procedures, along with a section assigned for the processing of catheters and equipment, adhering to stringent infection control protocols. The space designated for patient examination should contain a comfortable exam bed that can be raised or lowered and a chair with commode, which may be suitable for certain procedures, such as biofeedback or balloon expulsion tests [14]. Moreover, one should consider the need for data connection, oxygen supply, suction equipment, multiple power sources and an external electrical generator. To ensure patient privacy, comfort and reduce anxiety during procedures, the space should contain a curtain or a divider wall [13].

Equipment Storage, Safety and Cleaning Procedures

Specialized equipment needs to be safely stored in a clean space, with proper network connection and power supply, ideally near the area of patient examination and performing procedures [14, 17]. Due to the high cost of the equipment used for motility testing, together with catheter fragility, meticulous handling and processing are mandatory [14].

The implementation of strict and rigorous processing of high-resolution manometric catheters is essential. In most cases, the disinfection and maintenance procedures are based on the manufacturer's recommendations and in accordance with institutional guidelines. Emphasizing the importance of thorough training in the catheter disinfection process is crucial. This includes ensuring the required disinfection time, rinsing, drying, and proper storage [13]. Adherence to strict disinfection protocols will not only reduce the possible risk of contamination, but also prevent catheter damage, thereby extending the lifespan.

Education and Training in Neurogastroenterology

Despite the notable prevalence of functional gastrointestinal disorders in clinical practice, there is a substantial unmet need regarding motility training and medical staff education. At present, there is no national competency-based certification for medical staff performing and interpreting motility studies.

Most nurses and physicians receive training through faculty instruction, peer mentoring, guidance from motility equipment manufacturers, self-education, national or international exchange experiences, and hands-on workshops at dedicated conferences. Additionally, France is the country in Europe offering a certificate of competence in functional digestive pathology, attainable upon completion of a five-module training program conducted over the course of an academic year [18]. In this setting, there is a growing interest in standardizing motility curricula.

A relevant example of the current European landscape lies in the very small number of Neurogastroenterology professors. In France, out of a total of 131 gastroenterology and hepatology professors, only seven of them are actively practicing experts in the field of Neurogastroenterology [19].

Even though DGBIs are estimated to affect one third of British adults, significantly impacting their quality of life, these conditions are generally insufficiently addressed within the medical education system [9]. Interesting data derived from undergraduate training found that British curriculum includes IBS as the singularly mentioned functional digestive disorder [20]. Similarly, in a multicentric survey conducted among German medical students, only 39% of them indicated that their local curriculum addressed the field of Neurogastroenterology. Eighty-two percent of them expressed support for incorporating more Neurogastroenterology-related content into the standard curriculum, and 70% advocated for such in elective offerings [21].

The situation is quite similar in terms of post-graduate training, with Neurogastroenterology currently comprising a frequently overlooked subspecialty. In the United States, an informal survey encompassing over 170 gastroenterology programs, collectively training more than 1,300 fellows each year, revealed that merely 25% of these programs integrate some level of motility training. Additionally, advanced training in motility is provided by only about 12% of these programs [22]. A recent survey of Canadian gastroenterology trainees revealed similar findings, with only a third included in training programs which incorporated a motility rotation within their essential training requirements [23]. Likewise, a survey evaluating the interest, exposure to specialized training, and attitudes towards DGBIs diagnosis and management in the UK found that training opportunities are rather limited across all training grades. One hundred twelve trainees from the UK were involved in the assessment, which found that many of them were rarely comfortable establishing a functional diagnosis, as well as initiating neuromodulators [24]. These data highlight deficiencies in the post-graduate gastroenterology trainee curriculum, suggesting potential adverse impacts on patient care.

To tackle this challenge, the collaboration between the ANMS and the European Society of Neurogastroenterology and Motility (ESNM) led to the proposal of a joint guideline on Neurogastroenterology and motility training [25]. The main aim of devising this curriculum was to standardize training expectations globally, offering a three-tiered framework. The task force designed a stratified training approach, where Tier 1 emphasizes fundamental knowledge applicable to all gastroenterology trainees and practitioners in this domain. Tier

2 is considered suitable especially for trainees anticipating functional disorder testing and management to comprise a major part of their further professional careers. Meanwhile, the more advanced Tier 3 knowledge and training cater to trainees aspiring to dedicate their careers to Neurogastroenterology, with potential specialization in specific domains within the field [25].

Globally, certain institutions have focused their efforts on the design and implementation of clinical training initiatives aimed at raising awareness and offering novel learning opportunities for trainees interested in functional disorders. For instance, in the United States ten excellence centers have been specifically selected by the ANMS to partake in a one-month clinical training programs, yielding highly positive feedback from the mentees [22]. These training experiences involve attending specialized lectures, observing various motility procedures, engaging in inpatient consultations, interpreting motility tests, and assisting in endoscopic procedures related to the treatment of motility disorders. Vasant et al. [26] document the experience of one such high-volume center and emphasize that participation in such apprenticeships aids in developing essential skills in diagnosing and managing motility disorders. Additionally, a formal training program was organized by a Canadian group, which consisted of didactic sessions, workshops, and hands-on sessions, including live demonstrations. This resulted in a remarkable improvement in motility knowledge, objectively assessed as a significant improvement in post-course test scores [27]. Likewise, regarding undergraduate training, a recent French study performed on 484 gastroenterologists identified the existence of an internship as a main and positive factor that influenced the choice for gastroenterology as a preferred specialty [28]. Creating educational programs including e-learning sessions, changing the training curriculum by introducing dedicated specific training objectives for functional testing for young gastroenterologists along with the implementation of comparable training opportunities such as fellowships has the potential to address certain unmet deficiencies and raise the interest for this subspecialty. Over and above that, Romanian gastroenterology trainee curricula lack, at present, a specified and dedicated module for gastrointestinal functional procedures [29]. In this context, we recommend revising and updating the gastroenterology trainee curriculum to incorporate a dedicated module of no less than three months focused on functional digestive procedures.

The Road Ahead

Neurogastroenterology is regarded as an evolving field of Gastroenterology, with rising complexities of diagnoses and therapeutic strategies. Establishing and operating a motility laboratory represents a huge step in providing not only clinical testing and therapeutic procedures for the benefit of the patients, but also a research database and constant training roles [14]. Beginning with the need, or even the obligation to set up a motility service with basic equipment, the unit can gradually evolve into an advanced laboratory, offering sophisticated functional explorations and therapeutic procedures, depending on available experience, training and budget (Table II).

Table II. Specialized procedures in a highly advanced motility unit

| Procedure | Indication |
|--|--|
| Antro-duodenal manometry | Gastroparesis, intestinal pseudo-obstruction |
| Colonic manometry | Chronic constipation, pre-operative evaluation |
| Endoanal/endorectal ultrasound | Fecal incontinence |
| EndoFLIP | Dysphagia Achalasia |
| Trans-lumbosacral ano-rectal magnetic stimulation (TAMS) | Fecal incontinence Levator ani syndrome |
| ¹³ C Octanoic breath test | Gastroparesis |
| Functional Magnetic Resonance Imaging (MRI) | |
| Diaphragmatic breathing and biofeedback | Rumination Aerophagia |
| Biofeedback therapy | Dyssynergic defecation Fecal incontinence |
| Trans lumbosacral neuromodulation therapy (TNT) | Fecal incontinence |

Given the existing incidence of DGBIs and the challenges they pose in clinical practice, this mandates a close collaboration with other specialties, such as otolaryngology, pulmonology, rheumatology or surgery, thereby fostering a multidisciplinary approach for optimal patient management [10].

The expansion and advancement of the motility unit necessitates ongoing training and education, along with a continuous acquisition of specialized skills through competency-based certification. Therefore, to ensure comprehensive and standardized patient care, access to training workshops, conferences, and seminars should be facilitated and supported by gastroenterology societies [10]. Furthermore, the training of young gastroenterologists should include revising the current trainee curriculum to incorporate a specialized module focused on functional gastrointestinal explorations. Another important and unresolved issue is the lack of an agreement regarding certification of competency in the management of patients with GI motility disorders. It remains uncertain who will ultimately be responsible for certifying competency in motility testing and overseeing the maintenance of this competency through quality assessments. However, through the collaborative efforts of professional societies, it should be possible to establish sustainable certification processes and implement effective quality measures.

Finally, there is a growing need for standardized protocols regarding motility testing and data interpretation to ensure data accuracy and consistency.

CONCLUSIONS

Neurogastroenterology is an essential area of Gastroenterology, requiring dedication and strong communication skills, leading to optimal patient-centered care. Establishing and expanding a motility unit within a community or an academic practice provides novel pathways for clinical and scientific research, enabling a deeper understanding of the pathophysiology of DGBIs, with patient benefit being the main goal.

Conflicts of interest: None to declare.

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