



## Specialty Neurosurgery Hospitalists: Neurosurgeons' Perspectives

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Journal of Brown Hospital Medicine

Vol. 3, Issue 2, 2024

### Article Information

Keywords: hospitalist, internal medicine consults, medical management, perioperative management

<https://doi.org/10.56305/001c.94516>

Submitted: September 26, 2023 EDT

Accepted: February 28, 2024 EDT

### Abstract

Neurosurgery is increasingly performed on patients with significant medical co-morbidities. These could both delay surgery and can lead to postoperative complications. This situation highlights the role played by internal medicine-trained physicians, which include both outpatient providers and hospitalists. In our experience, the best care is provided in close collaboration between neurosurgeons and internal medicine physicians. In this article, we provide the view from the standpoint of a neurosurgeon. Management of co-morbidities by internal-medicine physicians enables neurosurgeons to focus on surgical care, improves patient's experience and leads to improved resident training.

The specialty of hospital medicine emerged in the 1990s and has continued to expand and evolve within the American healthcare system.<sup>1</sup> In recent years, sub-specialization within hospital medicine has developed; examples include hospitalists who focus solely on caring for hospitalized general surgery, orthopedic surgery, or neurosurgery patients. This sub-specialized hospitalist model may allow for increased efficiency in hospital care since specialized hospitalists are attuned specifically to the nuances of patients with specific surgical conditions.

### MODELS OF HOSPITALIST COLLABORATION

For the care of surgical patients, two predominant models of collaboration with hospitalists have generally been implemented – consultation and co-management. In the consultation model, hospitalists see specific patients; typically, complex medical patients with multiple comorbidities- at the request of the surgeon and focus on a specific consultation question (e.g. pulmonary optimization after lumbar fusion for a patient with severe obstructive pulmonary disease). In this model, hospitalists leave recommendations, but implementation of recommendations are left to the surgeon.<sup>2</sup> An alternative model is the co-management model, in which hospitalists share the responsibility of a broad range of medical problems for surgical patients. A key feature of this model is that roles and responsibilities are negotiated in advance. Generally, the co-management model entails that hospitalists focus on the comprehensive care of medical comorbidities and can write orders without the surgeon's prior approval.<sup>2</sup> The co-management model permits the surgical team to focus on completion of surgical procedures and relies on the expertise of specialized hospitalists for preoperative optimization and perioperative management of complex

medical comorbidities. The day-to-day care for neurosurgical patients is provided by neurosurgery residents, nurse practitioners and hospitalists.

### THE THOMAS JEFFERSON UNIVERSITY SYSTEM

At our institution, we utilize a hybrid co-management and consultation model with our hospitalist colleagues. The Farber Hospitalist Service (FHS) of the Department of Neurological Surgery at Thomas Jefferson University is comprised of physicians trained in internal medicine or family medicine who specialize in perioperative neurosurgical issues including postoperative recovery, central nervous system infections, coagulopathies, fever of central origin, and management of corticosteroid-related complications.<sup>3</sup> Importantly, FHS functions as a Division within the Department of Neurosurgery. FHS leadership meets regularly with the leadership of hospitalist teams which are part of the Department of Medicine to discuss items of mutual interest (e.g. COVID-19 care guidelines). Internal medicine residents rotate through FHS on an elective basis. We infer that professional satisfaction amongst FHS hospitalists is high as evidenced by minimal provider turnover on the FHS service.

At Jefferson, all neurosurgery patients undergo preoperative risk stratification and optimization. For patients with low-risk medical comorbidities (e.g. well controlled diabetes or hypertension) and minimal cardiac history, FHS provides preoperative risk stratification and optimization. For high-risk, medically complex patients with extensive cardiac history and/or multiple comorbidities, FHS functions as comanager with the neurosurgery service. In this setting, FHS hospitalists actively manage comorbidities, place orders in real time, and contact other

appropriate consulting services. In the postoperative period, FHS hospitalists rounds daily at the bedside with the nurses, nurse practitioners, occupational therapists, physical therapists, and case management.

A unique model that our institution employs is the role of neurosurgery hospitalists as the primary service for certain neurosurgery-affiliated diseases. In this model, the neurosurgery team functions as a consulting service and neurosurgery hospitalists assume the overall medical management.<sup>3</sup> The typical use case for this scenario is a primary diagnosis which may require operative intervention, but also will require extensive medical workup. Examples include spinal osteomyelitis, spinal tumors, postoperative infections/sepsis, pulmonary embolism or venous thrombosis during postoperative period, or admission for a likely medical complaint with a neurosurgical pathology remaining on the differential (e.g. altered mental status in a dementia patient who has a ventriculoperitoneal shunt). This model allows the neurosurgery service to focus on any indicated procedures, while medical management of complex comorbidities is performed by specialty-trained neurosurgery hospitalists. An added benefit of pre-negotiated roles/responsibilities is that workup for conditions such as spinal osteomyelitis can begin seamlessly, without time and effort wasted on the interdisciplinary debate of a "medicine versus surgery" admitting team.

#### **ADVANTAGES OF SPECIALIZED HOSPITALIST TEAMS IN NEUROSURGERY**

Specialized training for hospitalists offers an opportunity to gain detailed knowledge of neurological diseases and how these interleave with medical comorbidities. Furthermore, there are medical scenarios more commonly seen in neurosurgical patients that may benefit from specialized management, including corticosteroid-induced adverse effects, strict blood pressure control, sequelae of paresis/paralysis, cognitive deficits, disorders of sodium hemostasis, endocrinopathies, and hospital-acquired delirium.

The practice of hospitalist co-management of neurosurgical patients has been associated with improvement in several quality measures, including decreased rate of medical complications, rapid response team calls, and length of stay.<sup>4</sup> Several studies have also identified significant cost-savings with the utilization of a co-management model.<sup>4,5</sup>

We find our institution's neurosurgery hospitalist model effective for several reasons. Our neurosurgery hospitalists are exclusively focused on neurosurgical patients, which ensures multiplicative experience in recognizing and treating the medical complications which frequent

neurosurgical disease. Surgeons may be occupied in the operating room for long periods of time and thus less readily available for issues that arise in hospitalized patients; in this situation, the ready availability of hospitalists becomes key for efficient medical care. Lastly, the neurosurgery service and the FHS function under the same department, facilitating collaboration, fostering a collegial working relationship, and cross-specialty didactic teaching opportunities.

#### **CONCLUSION**

The success of the neurosurgical hospitalist team at Thomas Jefferson University demonstrates the value of specialized hospitalist training and collaboration across specialties. Hybrid consultation and co-management models allow for an adaptive approach to management based on individual patient needs.

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#### **Author Contributions**

All authors have reviewed the final manuscript prior to submission. All the authors have contributed significantly to the manuscript, per the International Committee of Medical Journal Editors criteria of authorship.

- Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND
- Drafting the work or revising it critically for important intellectual content; AND
- Final approval of the version to be published; AND
- Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

#### **Disclosures/Conflicts of Interest**

The authors have no conflicts of interest to declare.

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