The financial contribution of the multiple sclerosis specialist

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Abstract

Purpose of review: To examine the financial effect of the multiple sclerosis (MS) specialist on the academic health center (AHC). **Recent findings:** Using data derived from an academic MS center with respect to patient numbers and practice pattern regarding diagnostic studies and disease-modifying therapies (DMT) coupled with reasonable assumptions regarding the profit margin for tests and treatments, 1 full-time MS specialist (1 clinical full-time equivalent [cFTE]) may annually generate downstream revenue exceeding \$8,000,000. If all diagnostic studies and therapies were obtained at the facility, the potential revenue generated for the facility can exceed \$25,000,000 per 1 cFTE. These calculations do not include the professional net revenue generated by referrals to other professionals. **Summary:** With current models of reimbursement for health care, the MS specialist provides an enormous potential source of revenue for the AHC. This information is critically important in obtaining institutional support for the provision of labor-intensive MS care. *Neurol Clin Pract* 2017;7:246-255

In 1992, Medicare implemented the resource-based relative value scale, which established payments for physicians' services based on relative services.¹ This scale is determined by the Centers for Medicare and Medicaid Service in consultation with the Specialty Society Relative Value Update Committee of the American Medical Association.¹ The relative value unit (RVU) was designed to reflect 3 cost components: the physician's work (time, skill, and training to provide the service), the practice expenses, and the professional liability insurance. The physician's work accounts for 52% of total payments, the practice expense 44%, and the professional liability fee 4%.² The RVU has been widely employed in 3 fashions: assessing productivity, cost, and benchmarking.³ The RVU has also been successful in increasing clinical productivity in academic health centers (AHC).⁴ According to the 2011 Medical Group Management Association's Physician Compensation and Productivity Report, more than 60% of physicians are compensated on the basis of some type of the work RVU metric.⁵ This measure is similarly employed by AHCs in physician compensation. While physicians are typically well aware of the number of RVUs they generate, they are often unacquainted with the downstream revenue generated by their activities. This

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exercise is designed to demonstrate the financial contribution of the academic neurologist and the multiple sclerosis (MS) specialist, in particular, to the bottom line of the AHC.

In a study utilizing Medicare Provider Utilization and Payment Data from 2012, the median neurologist received nearly 75% of payment from evaluation and management (E/M) codes.⁶ Over 20% of neurologists received all of their payment from E/M services.⁶ With rare exception, the MS specialist is fully dependent on E/M services. RVU targets set by the AHC may be difficult to achieve due to the complex nature of MS and the considerable time commitment required for its day-to-day management; many of these activities are neither readily converted to RVUs nor reimbursable.

A survey of the chief financial officers for 3,500 US health care centers, performed by Merritt Hawkins, a physician recruitment firm, in 2016 revealed that the estimated average net inpatient and outpatient revenue generated for the facility by a single full-time neurologist was \$1.025 million.⁷ In comparison to other specialties, the net revenue generated by the neurologist for the hospital was significantly less than that of many other disciplines including orthopedic surgery, neurosurgery, cardiology, and family practice.⁷ Similar data for an academic neurologist have not been published. In 2012, using methodology identical to that of the Merritt Hawkins analyses, the facility technical revenue generated by a 1 clinical full-time equivalent (cFTE) neurologist in the Department of Neurology at the University of Kentucky was calculated with assistance of the University of Kentucky Health Care Finance services (figure 1). In addition, the net professional revenue from consultation to other services was calculated per provider. At that time, there were 29 qualified providers in the department. The average cFTE per provider was 0.6; therefore, 60% of their time was allocated to clinical endeavors. Other activities, e.g., administration, teaching, and research, accounted for the other 40% of effort. The technical revenue generated per provider was \$1,099,747. These are the downstream revenues generated by technical fees, including imaging, electrophysiologic, and laboratory studies, among others. When corrected for the 60% clinical effort, the technical revenue per 1 cFTE in the department was \$1,832,912. Professional net revenue per provider—namely, revenues generated by consultations to other professionals—was \$49,342. The corrected value for professional net revenue per 1 cFTE was \$82,237. Therefore, the combined revenue for technical and professional services per provider was \$1,915,149. This

Figure 1 Department of Neurology at the University of Kentucky, 2012

Combined technical and professional revenue per 1 clinical full-time equivalent (cFTE). Corrected technical and professional revenue per 1 cFTE calculated by dividing actual number by average percentage of clinical time of 0.6 (60%).

amount exceeds that of the average community neurologist 1 cFTE by more than \$800,000, likely the consequence of the complexity of the cases referred to an academic department and their need for additional services. As robust as the contribution of the average academic neurologist is, that of the MS specialist is even more substantial.

Downstream revenue generated by the MS specialist

With rare exception, the MS specialist is dependent on E/M codes for generating RVUs. When compared to other divisions within an academic neurology department, MS seldom exceeds midlevel ranking for revenue generation and is generally positioned well behind epilepsy, neuromuscular, and stroke divisions in earnings per cFTE. However, this may vary from institution to institution and is dependent on referral patterns, divisional size, research efforts, administrative responsibilities, and other factors. In 2016, at the University of Pennsylvania, the gross charges of the MS division were sandwiched between that of the cognitive and stroke divisions and one-fourth that of the epilepsy division. However, the contribution and potential contribution to the downstream revenue of the AHC significantly surpasses that of not only other divisions within a neurology department, but also most other disciplines.

MS care is labor-intensive and, as noted, dependent on E/M codes. Explaining the nature of the diagnosis and treatment options frequently exceeds the 45 minutes or 1 hour allotted for a new patient visit and often requires more than 1 visit. These patients, particularly those with advanced disease, often have multiple comorbidities that are time-consuming to address. Unmeasured physician efforts often include the response to patients' and their families' concerns outside the office visits and the time spent justifying needed MRIs or laboratory studies and overcoming the hurdles to drug initiation or therapeutic switches including educating the patient and the family about therapeutic options and overcoming barriers placed by the patient's insurer to their initiation. Fulfilling the needs of the patient appropriately and avoiding physician burnout requires support staff (nurses, nurse practitioners, physician assistants, pharmacists, secretaries, and clerical staff). Their numbers and composition vary among practices and these positions may or may not be supported by the AHC. Demonstrating the generally unrecognized but very substantial contribution margin generated by the MS specialist to the AHC should prove beneficial in obtaining the necessary support for the infrastructure of a successful MS clinic.

A careful examination of the prudent evaluation and management of the typical patient with MS explains how the MS specialist contributes to the financial health of the institution. Table 1 lists the potential sources for generating hospital revenues. First, the initial assessment of the patient suspected of having MS includes brain and cervical MRIs and, frequently, thoracic MRIs. Other studies include a panel of laboratory studies, a battery of evoked potentials, and often a lumbar puncture. Once the diagnosis is established, therapy is initiated. A very substantial source of revenue is the specialty pharmacy of the parent institution if it is capable of providing disease-modifying therapies (DMTs) to the patients cared for in the MS clinic. This is especially true if the specialty pharmacy qualifies for Medicare 340B drug pricing, a program that was established by US Congress in 1992 to provide outpatient drugs to eligible health care organizations at considerably reduced prices. The DMTs are obtained at very steeply discounted prices and, in light of the average expense for these drugs being on the order of \$60,000 annually,⁸ the institution derives a very large profit. The difference between acquisition cost and the price of a DMT is proprietary. However, a study by the Office of the Inspector General of the Department of Health and Human Services determined that Part B-covered entities received 58% more than the cost of the drug.⁹ Assuming that the average monthly cost of a DMT is \$5,000, the monthly profit for the facility would be \$2,900 per patient. The analysis in the accompanying spreadsheets (figures 1 and 2) conservatively assumes a \$2,500 monthly profit per patient and is accompanied by sensitivity analyses for both new and follow-up patients showing the potential contribution of DMTs with other assumptions. Similarly, infusions that are performed at the parent

Table 1 Sources of revenue other than evaluation and management codes generated by multiple sclerosis (MS) clinicians

Initial evaluation typically encompasses the following:
Panel of laboratory studies
MRIs (brain, cervical, and thoracic spine MRIs)
Battery of evoked potentials
Optical coherence tomography
Lumbar puncture
Disease-modifying therapy potentially filled by hospital specialty pharmacy
Infusion services
Infusions of disease-modifying therapies, e.g., natalizumab, rituximab, and ocrelizumab
Infusion of corticosteroids for MS relapses
Follow-up evaluations
Laboratory studies
MRI (brain and cervical spine; occasionally thoracic MRIs)
Consultations
Physical and occupational therapy
Physical medicine and rehabilitation
Urology
Psychiatry
Psychology
Others

institution, e.g., those for natalizumab and rituximab, generate large profits for the institution. In addition, every relapse treated with high-dose corticosteroids at the institution or by an institutional home infusion unit also produces a profit for the AHC. Patients with MS routinely have repeat imaging studies and it is not unusual for brain, cervical, and thoracic MRIs to be repeated at 6-month intervals following the initiation of a new DMT before becoming annual events. Finally, physical and occupational therapy, physical medicine and rehabilitation, urology, psychiatry, and psychology are frequently consulted by patients with MS. Figures 2 and 3 demonstrate the potential facility revenue of the MS specialist for new and follow-up outpatients, respectively.

As the profit for the above activities may be difficult to calculate, may not be shared by the institution, and may vary considerably among AHCs due to differences in charges and fixed and variable costs, several assumptions have been made with respect to these numbers. The number of new and follow-up patients seen by 1 cFTE is based on experience of the MS Center at the University of Pennsylvania. Table 2 lists the profit for each study performed or for drug administration provided it is provided by a specialty pharmacy with the associated AHC under Medicare 340B.

AHCs may not attempt to calculate the downstream revenue generated by the MS specialist or be willing to share the data even if they do; therefore, an approximation can be calculated using the formulas provided with the realization that the number of new and follow-up patients seen, practice pattern with respect to diagnostic studies, profit margins for the diagnostic studies, and percentages of the DMT prescriptions filled by the institutional specialty pharmacy, if any, may differ among practices. An example is provided in figures 2 and 3 derived from available data for the MS Clinic at the University of Pennsylvania with respect to the average number of new and follow-up patients seen per 1 cFTE annually, requests for laboratory studies, MRIs,

Figure 2 Downstream revenue generated by 1 clinical full-time equivalent during the course of 1 year for new patients

Supplemental Data

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evoked potentials, and optical coherence tomography, and DMT prescribing patterns. An Excel spreadsheet is provided (Appendix e-1 available at Neurology.org/cp) to allow this calculation to be performed for other MS specialists. An identical approach can be used by other neurologic subspecialists to determine their contribution to their facilities' revenues.

Figure 3 Downstream revenue generated by 1 clinical full-time equivalent during the course of 1 year for follow-up patients

Table 2 Estimated profits from diagnostic studies performed at the academic health center (AHC) and disease-modifying therapies (DMTs) provided by the AHC

Diagnostic study	Profit/study
MRI	\$1,000
Battery of evoked potentials	\$250
Optical coherence tomography	\$40
Lumbar puncture	\$150
Laboratory panel performed on new patients	\$350
Laboratory panel performed at the time of follow-up	\$50
Disease-modifying drugs	Profit/monthly prescription
DMTs provided by specialty pharmacy under Medicare 340B	\$2,500
Infusion of DMTs	\$2,150/infusion
Infusion of methylprednisolone during relapses	\$500/set of infusions

Therefore, the potential downstream revenue of 1 cFTE academic MS specialist for new and follow-up patients is \$29,247,450 (\$6,310,200 for new patients and \$22,937,250 for follow-up patients) (tables 3 and 4). These calculations do not include the professional net revenue generated by referrals to other practices, e.g., radiology interpretations, physical and occupational therapy, physical medicine and rehabilitation, urology, and psychiatry. The estimated revenue is between \$75,000 and \$100,000 per cFTE. Importantly, these calculations were based on the assumption that all diagnostic studies, DMTs, and consultations are performed through the AHC; however, exigencies related to insurance coverage, cost, convenience, and other issues preclude the performance at a single institution. Using the current utilization in the University of Pennsylvania MS practice, virtually all electrodiagnostic and OCT studies and corticosteroid infusions for relapse, 90% of lumbar punctures, approximately 60% of other laboratory studies, 70% of imaging studies, 70% of infusion therapies, and 20% of new

Table 3 Sensitivity analysis for the contribution of disease-modifying therapies (DMTs) for new patients

\$5,281,250	100%	90%	80%	70%	60%	50%	40%	30%
\$750	\$1,584,375	\$1,425,938	\$1,267,500	\$1,109,063	\$950,625	\$792,188	\$633,750	\$475,313
\$1,000	\$2,112,500	\$1,901,250	\$1,690,000	\$1,478,750	\$1,267,500	\$1,056,250	\$845,000	\$633,750
\$1,250	\$2,640,625	\$2,376,563	\$2,112,500	\$1,848,438	\$1,584,375	\$1,320,313	\$1,056,250	\$792,188
\$1,500	\$3,168,750	\$2,851,875	\$2,535,000	\$2,218,125	\$1,901,250	\$1,584,375	\$1,267,500	\$950,625
\$1,750	\$3,696,875	\$3,327,188	\$2,957,500	\$2,587,813	\$2,218,125	\$1,848,438	\$1,478,750	\$1,109,063
\$2,000	\$4,225,000	\$3,802,500	\$3,380,000	\$2,957,500	\$2,535,000	\$2,112,500	\$1,690,000	\$1,267,500
\$2,250	\$4,753,125	\$4,277,813	\$3,802,500	\$3,327,188	\$2,851,875	\$2,376,563	\$1,901,250	\$1,425,938
\$2,500	\$5,281,250 ^a	\$4,753,125	\$4,225,000	\$3,696,875	\$3,168,750	\$2,640,625	\$2,112,500	\$1,584,375
\$2,750	\$5,809,375	\$5,228,438	\$4,647,500	\$4,066,563	\$3,485,625	\$2,904,688	\$2,323,750	\$1,742,813
\$3,000	\$6,337,500	\$5,703,750	\$5,070,000	\$4,436,250	\$3,802,500	\$3,168,750	\$2,535,000	\$1,901,250
\$3,250	\$6,865,625	\$6,179,063	\$5,492,500	\$4,805,938	\$4,119,375	\$3,432,813	\$2,746,250	\$2,059,688
\$3,500	\$7,393,750	\$6,654,375	\$5,915,000	\$5,175,625	\$4,436,250	\$3,696,875	\$2,957,500	\$2,218,125

Percentage of new patients receiving DMT compared to monthly profit from DMT.

^aAssumed profit margin for the DMT and percentage of patients started.

Knowledge of how revenue is generated and distributed within an AHC is critical for understanding the intrinsic value of clinical programs and improving the dialogue between administration and physician leadership with respect to resource allocation.

patient prescriptions are through the AHC. Therefore, the estimate for the annual institutional downstream revenue with current practice patterns is approximately \$1,774,013 for new patients and \$6,603,450 for follow-up patients for an aggregate of \$8,377,463. While this number is considerably below the potential revenue, efforts are underway to secure as many of these services at the institution as possible.

These calculations were based only on outpatients to the MS clinic. Hospitalizing a patient with MS or related disorder may lose money for the institution. Hospitalization is a relatively rare event for the average patient with MS. As of 2010, rates of hospitalization for the MS population are only slightly higher than that of the general population.¹⁰

An important caveat in interpreting these numbers is that they were based on several assumptions. First, the profits for each of the studies and therapies are estimates and may be higher or lower than that cited. Second, these numbers were generated using the practice patterns of 1 group of academic MS neurologists. As there are no accepted standards, the performance of diagnostic studies and the therapies administered will vary from practice to practice. Third, it was estimated that approximately 10% of all follow-up patients were not receiving DMTs as they had progressive MS (either primary progressive or secondary) and had previously failed to respond to therapy. Fourth, the specialty pharmacy at the University of Pennsylvania operates under a Medicare 340B drug pricing program that may not be true at other institutions. Currently, only a minority of prescriptions are being filled by the hospital specialty

Table 4 Sensitivity analysis for the contribution of disease-modifying therapies (DMTs) for follow-up patients

\$18,900,000	100%	90%	80%	70%	60%	50%	40%	30%
\$750	\$6,300,000	\$5,670,000	\$5,040,000	\$4,410,000	\$3,780,000	\$3,150,000	\$2,520,000	\$1,890,000
\$1,000	\$8,400,000	\$7,560,000	\$6,720,000	\$5,880,000	\$5,040,000	\$4,200,000	\$3,360,000	\$2,520,000
\$1,250	\$10,500,000	\$9,450,000	\$8,400,000	\$7,350,000	\$6,300,000	\$5,250,000	\$4,200,000	\$3,150,000
\$1,500	\$12,600,000	\$11,340,000	\$10,080,000	\$8,820,000	\$7,560,000	\$6,300,000	\$5,040,000	\$3,780,000
\$1,750	\$14,700,000	\$13,230,000	\$11,760,000	\$10,290,000	\$8,820,000	\$7,350,000	\$5,880,000	\$4,410,000
\$2,000	\$16,800,000	\$15,120,000	\$13,440,000	\$11,760,000	\$10,080,000	\$8,400,000	\$6,720,000	\$5,040,000
\$2,250	\$18,900,000	\$17,010,000	\$15,120,000	\$13,230,000	\$11,340,000	\$9,450,000	\$7,560,000	\$5,670,000
\$2,500	\$21,000,000	\$18,900,000^a	\$16,800,000	\$14,700,000	\$12,600,000	\$10,500,000	\$8,400,000	\$6,300,000
\$2,750	\$23,100,000	\$20,790,000	\$18,480,000	\$16,170,000	\$13,860,000	\$11,550,000	\$9,240,000	\$6,930,000
\$3,000	\$25,200,000	\$22,680,000	\$20,160,000	\$17,640,000	\$15,120,000	\$12,600,000	\$10,080,000	\$7,560,000
\$3,250	\$27,300,000	\$24,570,000	\$21,840,000	\$19,110,000	\$16,380,000	\$13,650,000	\$10,920,000	\$8,190,000
\$3,500	\$29,400,000	\$26,460,000	\$23,520,000	\$20,580,000	\$17,640,000	\$14,700,000	\$11,760,000	\$8,820,000

Percentage of follow-up patients receiving DMT compared to monthly profit from DMT.

^a Assumed profit margin for 90% of follow-up patients on DMTs.

pharmacy, although that is changing rapidly. Finally, these calculations do not include the other side of the equation, namely, the expenses related to the provision of MS care. These expenses include compensation for physicians, other health care workers, and staff providing the care, cost of space, equipment, supplies, and other overhead costs. Determining these expenses can be exceedingly complex and is beyond the scope of this effort. Consequently, the true contribution margin, the total revenue minus variable costs, cannot be easily determined. Nonetheless, the variable expenses related to MS care are vastly exceeded by the revenue generated. Knowledge of the latter provides a starting point for the calculation of the contribution margin.

DISCUSSION

Like many other physicians,¹¹ the academic neurologist often feels overworked and under-resourced despite the dramatic increase in the health care workforce. From 1990 through 2012, the US health care workforce expanded by 75%; however, all but 5% of the job growth was in administrative staff.¹² The ratio of physicians to other health care workers in 2013 was 1:16.¹² In 2013, when the average median revenue for the hospital generated by a neurologist was estimated to be \$691,406 and the median hospital compensation for a neurologist was \$280,000,¹³ the revenue-to-compensation ratio was 2.47. By 2015, the revenue generated by the neurologist for his or her affiliated hospital had increased substantially to \$1.03 million.¹⁴ Without major change in compensation, the revenue-to-compensation for the community hospital-based neurologist had increased to 3.68. Similar revenue-to-compensation margins for hospital-based neurosurgeons are 2.52:1; orthopedic surgeons 5.17:1; invasive cardiologists 4.24:1; and hematologists/oncologists 4.89:1.¹³ If the calculations derived from the members of the Department of Neurology at the University of Kentucky in 2012 are generalizable, the revenue-to-compensation for the academic neurologist is substantially higher than that of the community hospital-based neurologist. According to the Medscape Neurologist Compensation Report of 2014, the average academic neurologist's compensation is \$177,000; therefore, the revenue-to-compensation ratio for an academic neurologist substituting just the technical revenue from the above formula (\$1,832,912) and the average academic neurologist's compensation (\$177,000) reveals a revenue-to-compensation ratio of 10.36. However, this assumes that the academic neurologist is working as 1 cFTE, which rarely pertains as other responsibilities including research, teaching, and administration are associated with variable time commitments. As noted, the average cFTE was 0.6, meaning that the average academic neurologist at the University of Kentucky spent 60% of his or her time performing clinical work with the rest of his or her activities allocated to other endeavors. Correcting for a cFTE of 0.6, the revenue-to-compensation was 6.21. These calculations indicate that the academic neurologist is playing an important role in the financial health of the AHC. As robust as the contribution of the average academic neurologist is, that of the MS specialist is even more substantial.

An Association of University Professors of Neurology survey published in 2004¹⁵ found that the majority of college of medicine academic neurology programs operate at or below break-even. In that survey, only 27% reported being profitable. Eighty-three percent were under moderate to severe financial pressure and there was considerable demand to see increasing numbers of patients, which can lead to both patient and physician dissatisfaction. Despite that, only 15% of neurology departments generated a profit from patient care, with one-third losing \$40 per patient visit to the clinic.¹⁵ Critical to the operation of an academic

Take-home points

- The financial contribution of an MS specialist to his or her health care facility can be substantial.
- The chief drivers for the facility's downstream revenue are the imaging studies performed and the cost of the disease-modifying therapy.
- The financial effect is considerable if the diagnostic studies are performed at the facility and the DMTs are provided by the facility under the Medicare 340B program.
- Calculating the financial effect of the MS specialist is critical to obtaining the necessary support from the facility for the provision of high-quality patient care.

department are the funds allocated to them from institutions that have been engendered by the clinical services of the department members. The amount of money transferred is at the discretion of the hospital CEO and the Dean, sometimes the same individual. In negotiating this amount, it is essential for department chairs to fully understand the contributions of the divisions within their departments. Even though the AHC is highly dependent on this downstream revenue, the administrations of many AHCs have either not determined the downstream revenue of individual service lines or are reluctant to share these data with physicians. Nevertheless, this information is critical in obtaining physician buy-in, in determining what investments are worthwhile with respect to program development, and in assessing physician compensation. With the sophistication of today's software programs, these numbers can be determined at a granular level.

The contribution margin of a well-supported MS division in which the AHC's specialty pharmacy, infusion programs, and radiology services are fully aligned can be substantial, likely exceeding that of other product lines within the neurosciences as well as those of other programs, such as cardiology and spine surgery, that historically have high contribution margins. It is important to recognize that this model only pertains to the current mechanism of reimbursement. Over time, efforts to increase value and decrease cost will almost certainly lead to other models of payment for health care, altering these calculations.

Knowledge of how revenue is generated and distributed within an AHC is critical for understanding the intrinsic value of clinical programs and improving the dialogue between administration and physician leadership with respect to resource allocation. For MS programs, this knowledge could be instrumental in negotiating for greater resources and improving the compensation of the MS specialist, perhaps increasing the appeal of a career in this discipline for neurology trainees in an era when the number of patients with MS cases, the second greatest cause of disability in young adults, continues to increase.^{16,17}

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J.R.B. was responsible for conception and design of the study and drafting and submitting the manuscript.

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