Functional Status and Its Uses in Rehabilitation Medicine

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Abstract

Background: Over the past decade and a half, rehabilitation medicine has developed and implemented standardized measures of functional status. Standardized measures of functional status are important for four reasons: (1) clinicians need them to determine whether interventions produce the expected outcomes; (2) managed care companies use them to decide which rehabilitation services and equipment will be paid for; (3) accreditation bodies such as the Commission on the Accreditation of Rehabilitation Facilities (CARF) require empirical functional status and functional outcome measures; and (4) public policy is moving toward a case-based payment system derived from patient need, and type and severity of impairment.

Methods: Review of the literature.

Conclusions: While researchers, clinicians, managed care, accrediting bodies, and federal regulation have each influenced rehabilitation as conceptualized, measured, and practiced, lack of coordination among these groups has hampered agreement on appropriate tools for functional assessment and outcome. Rehabilitation providers, however, will be increasingly accountable to government regulations and managed care companies.

Key Words: Functional status, functional outcomes, rehabilitation reimbursement, public policy.

THE GOAL OF MEDICAL REHABILITATION is to restore independent physical functioning to the greatest extent possible. For inpatient rehabilitation settings, the goal is to restore functioning so that the patient may return to the community. In an era of increasing cost constraints, however, many fundamental questions about the organization and delivery of rehabilitation services have arisen. The types of services, the setting in which they are provided, the measuring of service efficacy, and payment are all increasingly scrutinized by patients, providers, payers, and policy makers. This paper gives an overview of some of the key issues in functional status measurement and the role public policy has had in shaping services and measurement of functional outcomes.

Service efficacy and payment for rehabilitation services are central policy issues. In order to determine whether therapeutic interventions have achieved desired outcomes, a variety of functional status measures have been developed. There are several reasons why functional status measures are important: (1) rehabilitation clinicians and researchers have wanted to learn what interventions produce positive functional outcomes; (2) managed care increasingly scrutinizes what treatments are being given and whether the patient has made functional gains; (3) accreditation bodies such as the Commission on the Accreditation of Rehabilitation Facilities (CARF) and the Joint Commission on Accreditation of Health Care Organizations (JCAHO) require that rehabilitation medicine have an empirical system for evaluating program outcomes specific to impairments; and (4) federal regulatory bodies have made increased demands that rehabilitation be put under a case-based payment system rather than the current per diem reimbursement system.

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Clinical Issues

The primary reason functional status is measured is that program administrators and clinicians want to know whether their patients improve. Within clinical disciplines, there have been standard measures of functioning and progress, but no measure existed that summarized a patient's overall functioning or the progress in functioning that might be attributable to treatment. Moreover, clinicians and administrators want to be able to compare the outcomes of their treatment with that of treatment provided by others. This can only be accomplished if each provider consistently uses the same instruments and measures of function.

Early efforts were made in the 1960s to measure functional status, most notably Katz's Activities of Daily Living Index (1) and the Barthel Index (2). Since that time, there have been dozens of functional status measures developed for evaluation of rehabilitation patients. As a result, until the late 1980s, it was difficult to compare outcomes across studies, because different measures were employed. This made it difficult, if not impossible, to make generalizations about patient outcomes at different sites. To rectify the lack of standardization of instruments, the Functional Independence Measure (FIM) was developed in the 1980s by Carl Granger and colleagues (3), supported by the U.S. Department of Education. The FIM was developed by examining 36 existing functional status measures, and then testing and modifying them, until those items were identified that could reliably describe and summarize functional status.

The FIM contains 18 items: 13 items describe motor functioning, and 5 items describe cognitive functioning (Table 1). Each of the items is rated on a ranked number scale of 1–7, where 1 indicates total dependence on others to perform the activity and 7 indicates total independence. The range in total FIM scores is therefore 18–126. The FIM assessment is performed within 72 hours after admission and within 72 hours of discharge. It is conducted by direct observation of actual patient behaviors. In 1997, more than a quarter million FIM reports were submitted from nearly 600 rehabilitation facilities in the United States to the Uniform Data System (UDS) (4). UDS is responsible for collecting data, verifying results, and distributing quarterly and annual reports to rehabilitation facility subscribers.

The UDS provides additional information on patients, to help explain the treatment outcome. These variables include demographic characteristics, pre-rehabilitation living situation, payer, type of impairment, comorbid conditions, whether the patient had to return to acute care for a period of time (an interrupted stay), and overall length of stay (LOS).

The FIM has been shown to be reliable, valid, and internally consistent (5, 6). Its strengths are that it is easy to learn and administer, it is not time-consuming, and it provides the basis for a minimal dataset which adequately describes patient functioning. Physical therapists, occupational therapists, nurses, speech therapists, and recreation therapists may all serve as raters. Its major limitation is that it is only a summary. Moreover, cognitive functioning is represented by only five items, and certain areas of functioning dealing with the ability to return to the community are not represented at all. Finally, the numerical (ranked) nature of the measure places psychometric limitations on the instrument in interpretation of data (7).

Since the FIM is measured on admission and discharge, changes in functional status, and therefore functional outcomes, can be measured. The larger the change between admission and discharge, the greater the restoration of functioning. In addition, one may look at LOS to determine how long it takes to achieve these outcomes. When the change in FIM score from admission to discharge is divided by LOS, a measure of FIM gain per day, sometimes termed the FIM efficiency, is determined.

Managed Care

Managed care companies are providing health care insurance for an increasingly greater number of people. For example, in New York State, 17.7% of the population was covered by managed care in 1992; 27.9% were covered by in 1995. This represents an annual growth rate of 16.2% (8). Since virtually all patients who come to acute medical rehabilitation come from an acute care setting, managed care sets guidelines for what they will and will not pay. Managed care companies already know the patient's medical condition. In their capacity as gatekeepers, they also want to know at what level the patient is functioning, what the goals of rehabilitation will be, the duration of treatment, the discharge plan, and whether there is family support. The managed care companies may limit the types of patients who will be permitted to have rehabilitation and the number of days for which they will pay the institution. In many hospitals, there are trained nurses who regularly work with managed

TABLE 1

FIM™ instrument

Functional Independence Measure

LEVELS		
	7 Complete Independence (Timely, Safely) 6 Modified Independence (Device)	**NO HELPER**
	Modified Dependence 5 Supervision (Subject= 100%+) 4 Minimal Assist (Subject = 75%+) 3 Moderate Assist (Subject = 50%+) **Complete Dependence** 2 Maximal Assist (Subject =25%+) 1 Total Assist (Subject = less than 25%)	**HELPER**

Self-Care		**ADMISSION**	**DISCHARGE**	**FOLLOW-UP**
A.	Eating			
B.	Grooming			
C.	Bathing			
D.	Dressing - Upper Body			
E.	Dressing - Lower Body			
F.	Toileting			
Sphincter Control				
G.	Bladder Management			
H.	Bowel Management			
Transfers				
I.	Bed, Chair, Wheelchair			
J.	Toilet			
K.	Tub, Shower			
Locomotion				
L.	Walk/Wheelchair	W Walk C Wheelchair B Both	W Walk C Wheelchair B Both	W Walk C Wheelchair B Both
M.	Stairs			
Motor Subtotal Score				
Communication				
N.	Comprehension	A Auditory V Visual B Both	A Auditory V Visual B Both	A Auditory V Visual B Both
O.	Expression	V Vocal N Nonvocal B Both	V Vocal N Nonvocal B Both	V Vocal N Nonvocal B Both
Social Cognition				
P.	Social Interaction			
Q.	Problem Solving			
R.	Memory			
Cognitive Subtotal Score				
TOTAL FIM Score				

NOTE: Leave no blanks; enter 1 if patient not testable due to risk

care representatives to negotiate appropriate LOS for patients.

Accreditation Issues

Rehabilitation has its own accrediting body, the Commission on Accreditation of Rehabilitation Facilities (CARF). As a basis for accreditation standards, all inpatient rehabilitation programs must have a program evaluation component that includes standardized functional outcome measures. It is in the accreditation arena that standards have moved increasingly toward ensuring that functional outcomes are measured. CARF standards are more stringent and specific than those generated by public policy and are more rigorous in ensuring that appropriate resources are brought to patient care, with attendant outcomes reliably measured and linked to interventions. In addition, the Joint Commission on Accreditation of Health Care Organizations (JCAHO) reviews medical rehabilitation as part of its survey and accreditation process. In the future, CARF and JCAHO have made an agreement to assess hospital-based rehabilitation centers simultaneously, to avoid duplication of effort.

Regulatory Issues

Current interest in functional status measures is not entirely clinically or academically driven. Much of the impetus for using functional status measures in rehabilitation has its roots in federal legislation which mandated a change in hospital payments by Medicare from a per diem, cost-based rate, to a prospective payment system (PPS), or case-based rate, in 1983 (9). Diagnosis-related groups (DRGs) served to underpin case-based rates of reimbursement, irrespective of the length of stay by the patient. This was intended as a cost containment effort to curb Medicare spending for excessive hospital stays. The modeling procedure used to predict length of stay, a proxy for resource consumption, included diagnoses, procedures, age and gender. These variables, however, were inadequate to explain rehabilitation LOS (10) and rehabilitation was made exempt from PPS in 1982 in the Tax Equity and Fiscal Responsibility Act (TEFRA) (PL97-248). In exempting rehabilitation from PPS, however, Congress set a number of criteria in place which had to be met by rehabilitation facilities to receive Medicare payments. Under TEFRA, payment to qualified hospitals is based on traditional retrospective costs, with a per case payment cap added. Clinically, the most important criterion is that the patient be able to participate in at least three hours per day of physical therapy, occupational therapy, speech/language therapy, and other therapies. However, Congress has repeatedly mandated that a prospective payment system be developed for excluded rehabilitation facilities (11, 12).

To develop a PPS that would adequately explain resource consumption for rehabilitation, experts had long maintained that such a model would include patient functional status and that the specific diagnosis was of little importance. Specifically, the first goal was to accurately and adequately classify patients by level of functioning. This assumes a uniform measure of functional status for all rehabilitation patients. The second goal was to determine the level of impairment from the medical diagnosis. For example, it was necessary to differentiate those patients who survive stroke with little or no residual functional impairment from those who have lifelong disabilities requiring constant care. Third, identifying the level of functioning and the specific impairments would serve to develop a case mix index (a severity of impairment measure). The case mix index, in turn, would indicate the type and intensity of services needed by the patient to restore functioning to the greatest degree possible, thus facilitating a case-based payment system.

Work on development and usage of functional status measures to predict resource consumption began in the 1980s at RAND and the Medical College of Wisconsin (MCW) (13). This early study grappled with conceptualization and implementation of a method to classify rehabilitation patients, just as the work on DRGs had developed a patient classification system. Hence, there was great interest in determining whether a measure of functional status would adequately classify patients. In the RAND/MCW study, only 22% of LOS was explained by functional status and other variables. This early work evaluated functional status by retrospective chart review rather than concurrent, observation-based assessment of patients during a course of rehabilitation therapies.

Primary research on functional status as a basis for a patient classification system has been further developed by Stineman and colleagues at the University of Pennsylvania (14, 15). Stineman's work is derived from the admission FIM as the measure of functional status. At the core of Stineman's work is the conceptualization of mutually exclusive groupings of patients, termed Rehabilitation Impairment Categories (RIC), similar to the major diagnostic categories (MDCs) into which specific DRGs fall. In the

most recent model, 92% of all rehabilitation patients were able to be classified into one of the 20 RICs, indicating that the RIC model is able to describe impairments of almost all rehabilitation patients. Table 2 shows the 20 RICs.

The prevalence of patients in impairment groups varies widely. Fig. 1 compares data from the Mount Sinai Hospital to that from the United States as a whole for discharges occurring during the period from October 1, 1997 to September 30, 1998. The majority of cases reported nationally to UDS fall into stroke or orthopedic impairment groups. In contrast to the United States, at the Mount Sinai Hospital, somewhat fewer patients are classified with stroke or orthopedic conditions, whereas a larger proportion are classified with brain injury, spinal cord injury or medically complex conditions. In fact, The Mount Sinai Hospital treats three times as many patients with spinal cord injury and twice as many patients with brain injury as the norm for most rehabilitation centers across the United States.

To understand the data in Fig. 1, it is important to define what patients are classified in the various impairment groups. Patients with stroke have significant physical disabilities such that they cannot safely return home, yet they show promise for functional improvement. "Brain injury" refers both to non-traumatic etiology such as neoplasms or encephalitis and to traumatic injury from accidents and violence. Neurologic conditions include multiple sclerosis, polyneuropathies, Parkinson's disease, and Guillain-Barre syndrome. Spinal cord injury includes both non-traumatic sources of injury such as neoplasms, stenosis, and myelopathies, and traumatic injury from accidents and violence. Orthopedic conditions include hip fracture, hip replacement, and knee replacement. Debility occurs among patients who have become weakened as a result of prolonged hospitalization other than for cardiac and pulmonary conditions. Finally, "amputation" usually refers to a lower limb, generally as a sequela of diabetes or peripheral vascular disease.

Within each RIC, a number of Function-Related Groups (FRGs), analogous to DRGs, are meant to explain resource consumption. In the latest FIM-FRG model, the motor subtotal score of the FIM assessment (see Table 1) and age are used to develop distinct FRGs using a statistical methodology that classifies homogeneous groupings of patients similar to the methodology used to develop DRGs. In a few FRGs, the cognitive subtotal score of the FIM is used (see Table 1). From the 20 RICs, 67 FRGs were derived. Overall, FRGs explain 32% of the variance in LOS (15), similar to the predictive power of diagnoses in DRGs (16). Stineman and colleagues attempted to put ICD-9-CM codes or major diagnostic categories into the equation to define FRGs, but the increase in explained variance was negligible.

Functional outcomes vary by the types of patients who are treated. Different types of impairments mean that there will be different levels and types of functional gains. This is why an accurate case mix measure is imperative if these measures are to be used for reimbursement. Fig. 2 illustrates outcomes for the major impairment groups at the Mount Sinai Hospital from October 1997 through September 1998. These functional outcomes are approximately the same as for the population of subscribers to UDS across the United States. Most notable about this figure are the differences in functional ability at the time of admission and the differences in functional gain made during the rehabilitation stay, among the impairment groups, pointing to the heterogeneity in functioning among rehabilitation patients. For example, both brain injury and spinal cord injury patients are admitted with low FIM scores. Brain injury patients, however, tend to have both physical and cognitive disabilities. During the rehabilitation process, both cognitive and motor functioning improve. Among spinal cord patients, there is

TABLE 2
*FIM-FRGs, Version 2.0**

Rehabilitation Impairment Category (RIC)	Number of FRGs in RIC	R^2 LOS
1. Stroke	9	0.26
2. Non-traumatic brain injury	4	0.24
3. Traumatic brain injury	5	0.32
4. Traumatic spinal cord injury	4	0.23
5. Non-traumatic spinal cord injury	4	0.30
6. Guillain-Barre	2	0.30
7. Neurological	2	0.13
8. Lower extremity fracture	4	0.09
9. Joint replacement	7	0.16
10. Other orthopedic	2	0.08
11. Lower limb amputations	2	0.07
12. Other amputation	1	—
13. Osteoarthritis	2	0.12
14. Rheumatoid Arthritis	2	0.10
15. Cardiac	2	0.15
16. Pulmonary	3	0.19
17. Pain	2	0.02
18. Major multiple trauma (MMT)	2	0.18
19. MMT with brain/spine injury	3	0.37
20. Miscellaneous	3	0.15
Evaluation admission only	2	0.08
Overall system	67	0.32

* Adapted from Stineman et al., Health Services Research, 1997, 32, 4, p 537.

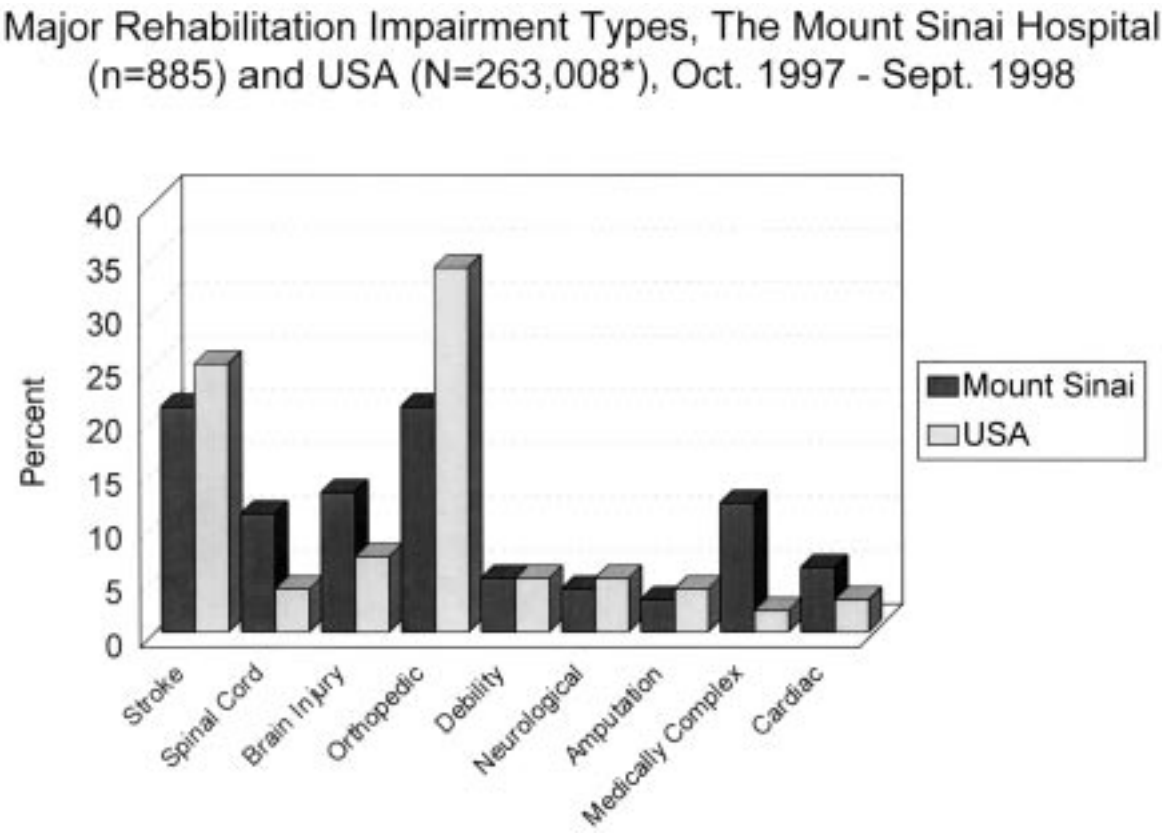

Fig. 1. Major rehabilitation impairment types, The Mount Sinai Hospital (n=885) and USA (N=263,008*), Oct. 1997–Sept. 1998.

* Source: Reprinted with permission of the Uniform Data System for Medical Rehabilitation (UDSmr/SM), State University at Buffalo, 232 Parker Hall, Buffalo, NY 14214.

often no cognitive impairment, but motor impairment is substantial. However, in all groups, statistically significant gains are made between admission and discharge. A detailed discussion of outcomes and LOS for specific FRGs within RICs is available in Stineman, Hamilton et al. (17).

Stineman's work has recently been validated with some modifications by Carter et al. (16), under contract with the Health Care Financing Administration (HCFA), which oversees Medicare payment and policy. Carter's aim was to determine whether the FIM-FRG would be an adequate basis from which to develop a case mix measure which would in turn serve as a basis for a rehabilitation PPS. FIM data were matched by case to Medicare claims files. Carter's validation model used a somewhat different case mix than is observed in the population of persons receiving inpatient rehabilitation, because most persons younger than 65 are not covered by Medicare. For example, traumatic spinal cord injury and traumatic brain injury tend to occur in younger populations, and they were underrepresented in Carter's Medicare population. Carter's model reduced the number of RICs to 18 by putting Guillain-Barre into the neurological RIC, and multiple trauma with brain and spinal cord injuries into the major multiple trauma RIC (see Table 2). Carter and colleagues also reduced the number of FRGs within any RIC to 5 or fewer.

Conceptually and structurally, Carter's model departs from the FIM-FRG model in two important respects. The first change in the model is the inclusion of ICD-9-CM codes for the purpose of recording the presence or absence of comorbidities or complications. This dichotomous variable is analogous to the DRG variable noting the presence or absence of comorbidities and complications. While statistical explanation of LOS was not greatly increased by including comorbidities or complications, the research team thought it clinically important.

The second modification to the model included a variable for interrupted stay. Interrupted stays occur when patients become acutely ill and cannot participate in therapy for a period of time. While only 3–4% of patients

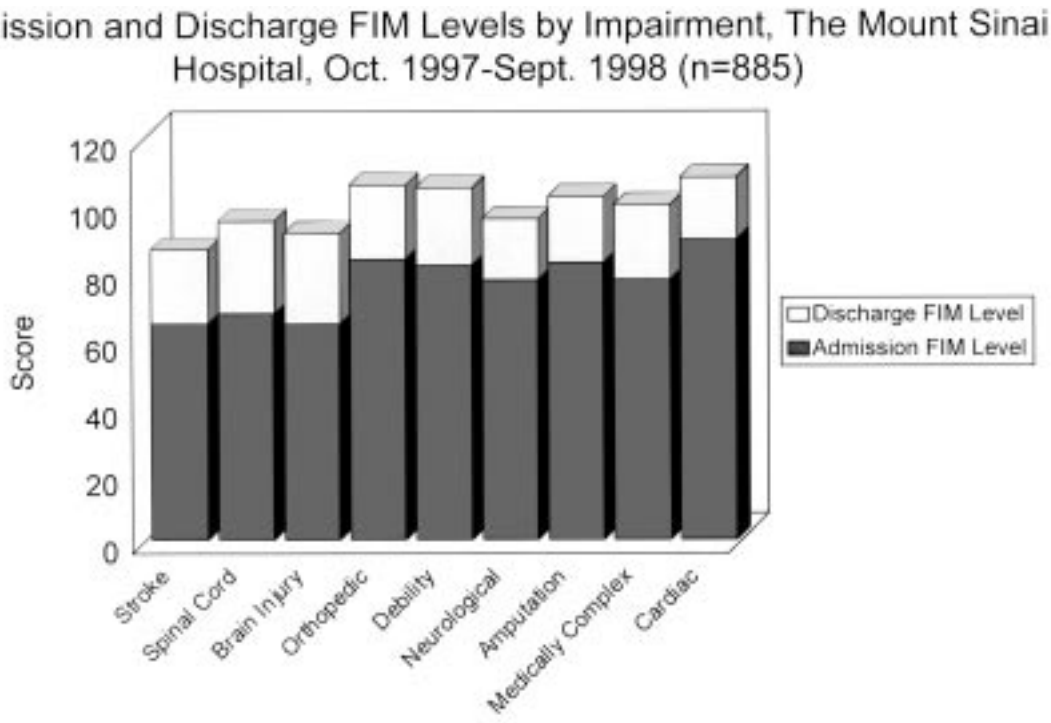

Fig. 2. Admission and discharge FIM levels by impairment, The Mount Sinai Hospital, Oct. 1997–Sept. 1998 (n=885).

FIM range: 18–126; Source: Department of Rehabilitation Medicine.

nationally experience interruptions (18), their total LOS is much longer than that of other patients, and Carter and colleagues found that interrupted stay costs were 40–60% higher than those for comparable patients with no interruption.

While one may conclude that the FIM-FRG model is able to explain resource use at an acceptable level, it remains empirically untested as a basis for a payment system. The FIM-FRG is a useful model in acute medical rehabilitation settings, but it may not apply to other post-acute care settings such as nursing homes, where patients receive less than three hours of therapies a day. The FIM-FRG model may not be applicable to nursing homes because there are differences in intensity and resources used in the nursing home compared to the acute medical inpatient rehabilitation setting. In addition, there is considerable functional and medical heterogeneity between nursing home and rehabilitation populations. To determine the extent of heterogeneity of patients and resources, HCFA is examining a number of broader-based classification systems in an effort to determine which would be the most efficient and effective for the purposes of payment.

The most recent Congressional mandate to develop a prospective payment system for settings previously exempt from PPS, such as acute medical rehabilitation, was included as part of the Balanced Budget Act (BBA) of 1997 (PL105-33). In the BBA, HCFA is mandated to implement a PPS for all post-acute care services, including rehabilitation, beginning in 2000 with a three-year phase-in to be completed in 2002 (BBA, 1997). The phase-in date, however, is likely to be later than the year 2000. HCFA is considering the use of an alternative tool now being tested in skilled nursing facilities. This is the Resource Utilization Groups or RUG-III system (12), derived from a larger assessment tool (19). The RUGs system has 44 categories of care, including 12 levels of rehabilitation care. In recent work, Fries and colleagues (19) have shown that RUGs explain more than 50% of the variance in resource use in nursing homes. However, resource use in nursing homes is defined as provision of nursing services only, not services from other health professionals such as rehabilitation therapists.

The benefit of the RUGs system is that groups of patients can be compared across types of facilities (i.e., rehabilitation units, nursing homes, home care), to develop equities in service delivery and payment, to reduce overlaps in service delivery and to achieve cost efficiency. However, the RUGs system is based on reimbursement for services given, which provides an

incentive for more services, thereby driving up costs (12). Additionally, there is evidence that the RUGs system does not explain resource utilization well among rehabilitation patients, nor do FIM scores explain resource utilization among nursing home rehabilitation patients with hip fracture or stroke (20). Issues of classification systems and payment mechanisms will continue under HCFA's Medicare demonstration programs.

Future Directions

Eventually there will be a PPS for inpatient rehabilitation services under Medicare, which considers rehabilitation as a post-acute care setting. Whether payment will be based on the FIM and RUG-III system embedded in the Minimum Data Set or some other measure of resource consumption has not yet been determined by HCFA. Much pressure has been put on HCFA by professional rehabilitation organizations to include the FIM motor items as part of the Minimum Data Set, since the motor portion of the FIM explains length of stay and resource consumption better than the RUG-III system, excluding FIM items in the rehabilitation setting.

As managed care increases its penetration into the health care insurance market, lengths of stay could be driven down by restrictions in rehabilitation benefits, moving patients more rapidly into outpatient or home-based rehabilitation. The risk in this scenario is that some patients may be medically fragile, and readmissions to either acute care or rehabilitation could erase potential savings by managed care companies. Readmissions should be closely monitored by hospital quality assurance committees in the future.

Rehabilitation philosophy and policy are moving beyond the assessment of patients at admission toward an accountability model of rehabilitation services, i.e., outcome-based measurements. Recent academic and clinical research has reflected this concern. For example, Stineman has recently proposed an outcomes-based model using both the discharge and admission FIM (21) or functional gains made during rehabilitation stay (22). CARF also proposes to move increasingly in this direction in its standards for the program evaluation role in medical rehabilitation.

Although the FIM-FRG methodology achieves its intent in development of a reimbursement mechanism and is more equitable in terms of reimbursement, there have been several criticisms of function-based systems to be used in reimbursement schemes. These criticisms may be extended to any measures which are done only on admission. The most important criticism is that there are no incentives to maximize patient functional outcome (23). Assessment of patient functional ability only on admission determines patient classification for presumed resource consumption, but not what services and other resources are actually delivered. Because outcomes are not measured, i.e., the difference between admission and discharge FIM levels, there is incentive for reducing costs by reducing LOS without a commitment to employing more resources for improving outcomes.

Another weakness of a case-based payment system is that patients who are expected to need heavy care may be denied access to rehabilitation facilities. For-profit institutions and facilities not associated with medical schools and therefore without an inherent interest in teaching and learning may be particularly prone to denial of heavy care cases.

Finally, there are "gaming" issues in any type of prospective payment system. Just as there has been "DRG creep," where acute care patients may be coded in such a way as to maximize illness characteristics to receive higher payment under a higher level DRG category, so, too, with any functional status measure, patients may be "coded down" on functional status measures on admission, to maximize reimbursement. The more statistically valid the assessment tool used to measure functional status, the less room there can be for "gaming" the system.

In sum, the organization and delivery of rehabilitation services will be in a state of flux as public policy mandates and statutes are put into place. The rehabilitation community, however, seems to have taken the debate a step further by building accountability into outcomes-based measures to better understand service efficacy.

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