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Improving Quality in Stroke Rehabilitation

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Abstract

Given the numerous quality improvement (QI) initiatives that have been undertaken in various medical fields, it is clear that inpatient rehabilitation services, particularly those geared toward stroke rehabilitation, can also benefit from these programs. To effectively evaluate the quality of rehabilitation services, indicators measuring structure, process, and outcomes must be included as part of any QI initiative. In addition to measuring quality, these indicators can be used to describe and address disparities in the provision of rehabilitation services on the basis of race, socioeconomic status, geography, disability status, and a multitude of other demographic factors. To improve quality and address health disparities associated with stroke rehabilitation, QI initiatives must be scientifically driven, continuing the trend of evidence-based practice in medicine. They must also remain flexible, because the science of quality improvement is an ever-changing field. It will be a challenge to convince physicians and other health care professionals that QI initiatives are a worthwhile investment of their limited time and resources, and further research is required to move the field of quality in stroke rehabilitation forward.

Keywords

health care disparities; quality indicators; quality of health care; rehabilitation outcomes; stroke

Importance of Quality Improvement (QI) Initiatives

More than a decade ago, the Institute of Medicine (IOM) issued a report stating that nearly 100,000 deaths occur in the United States each year as a result of preventable medical errors, the majority of which are caused by “faulty systems, processes, and conditions that lead people to make mistakes or fail to prevent them.”¹ Measuring the quality of medical care, including rehabilitation, is crucial to maintaining and improving the US health care system. A 2001 IOM report defined quality as “the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with the best available evidence.”² A day described the key criteria for evaluating quality: effectiveness, efficiency, and equity. The measure of effectiveness connotes whether services improve the health of patients and communities, the measure of efficiency evaluates these improvements in terms of the resources required to produce them, and the measure of equity examines health disparities and whether services are provided fairly. All three facets of quality measurement determine whether “the right thing is done, and whether it is done well.”³

Past quality improvement (QI) efforts have proven frustrating due to challenges associated with measurement, financial and professional interests that do not coincide with QI

initiatives, and a systemic lack of coordination across medical disciplines. Strasser described the “quality paradox” in which physicians and other health care professionals endorse the idea of QI but see the measurement of quality outcomes as a distraction from their clinical workload. In short, medical professionals will adopt methods to improve quality of services only if these methods produce better patient outcomes and make their jobs easier.⁴

Many of the barriers described in this paradox are the same as those that prevent physicians from adopting other evidence-based practices, and they have been described at length in the literature. In short, lack of participation in QI initiatives can be due to a lack of awareness or familiarity with the practices or initiatives, a disincentive to change attitudes, disagreement with proposed guidelines, and other barriers to changing one’s behavior.⁵ In addition to the quality paradox however, there are several potential consequences of QI initiatives that must be taken into account. If medical professionals begin to focus specifically on the aspects of patient care that are being measured, less time and money will be spent on improving other medical services. In addition, since much of what these professionals do in terms of patient care is not measured, rewards for those quality outcomes that are measured could lead to less effort and lower quality in other areas of care. As Fanestil mentions, the “art of medicine” can be difficult to measure, and we should not blindly accept the idea that an outcome will become better simply by measuring it.⁶ Finally, quality measurement could favor certain medical and rehabilitation practices over others. For example, large hospitals in urban areas with extensive electronic health record systems would be at an advantage compared to smaller hospitals in rural areas that do not have such capabilities.

The possibility that QI initiatives could lead to unintended consequences is not a reason to abandon these efforts. Instead academics, accrediting and funding organizations, and other stakeholders should consider adverse consequences when implementing a QI program and develop methods to minimize their effects.⁷

QI initiatives have proven useful in several medical fields. These initiatives have been used by surgeons to develop the surgical time out (STO) tool, which is a method for verifying patient identity and the intended operative site. Studies into STO focused on the use of prophylactic antibiotics as indicated, monitoring of relevant physiological indicators such as body temperature and blood glucose, and prevention of venous thromboembolism among other checks. They found that the enhanced quality and safety gained by employing the STO method led to lower malpractice premiums, which lowered the overall cost of care.⁸ Other quality improvement studies have focused on the need to improve communication and information transfer between hospitalists and primary care physicians during hospital discharge. The results of these studies have implications for measuring continuity of care, patient safety, patient and physician satisfaction, and resource use. Kripalani⁹ found that “deficits in communication and information transfer between hospital-based physicians and primary care physicians are substantial and ubiquitous.” In addition, the study found that unless these deficits were addressed, particularly by improving the accuracy and timeliness of discharge summaries, the result would be lower quality of follow-up care and the potential for adverse clinical outcomes and greater risk of re-admission.⁹ Time and again, the results of QI studies have been used to improve patient care and the overall health care system.

Given previous studies of quality improvement programs, it is clear that inpatient rehabilitation services are particularly primed to benefit from such programs. According to the Commission on Accreditation of Rehabilitation Facilities (CARF), “a Comprehensive Integrated Inpatient Rehabilitation Program is a program of coordinated and integrated medical and rehabilitation services that is provided 24 hours a day and endorses the active participation and preferences of the person served throughout the entire program.”¹⁰ For

both acute and subacute rehabilitation facilities, the only quality measures that have been widely adopted thus far are outcome measurements, such as change in functional status. However, as Eldar¹¹ notes, the quality of rehabilitation care is affected by several factors. These include interaction and effectiveness of multidisciplinary team members, rehabilitation goal setting, and communication of skills and motivation to the patients and their families. In addition, the appropriateness of care and responsiveness to changes in the long-term needs of the patients are pivotal.¹¹

To effectively measure the quality of rehabilitation services, 3 facets of health care must be taken into consideration: structure, process, and outcomes. These 3 components form what has been called the *Donabedian triad*. Structure represents systemic organization, staff knowledge and experience, and technology. Process describes factors such as patient compliance with guidelines and evaluative protocols followed by the rehabilitation facility. Outcomes measure changes in the patient's condition after an intervention compared to the patient's condition before it. These characteristics can be evaluated using several quality indicators, some of which are listed in Table 1. In addition, demographic variables, such as age, gender, race, and social supports, should be considered when undertaking QI initiatives. As Hoenig notes, improving quality of the structure of care can affect the process of care, which can improve rehabilitation outcomes. Therefore, all facets of the Donabedian triad are important targets for quality improvement in rehabilitation.^{12,13}

Measuring Quality of Rehabilitation Services Using Indicators

Quality indicators are not simply technical tools or checklists of diagnostic criteria that must be maintained. Rather, quality indicators allow facilities to define what is important to them when it comes to quality of care and what must be done to maintain it.⁷ In addition, indicators can be used to measure structure, process, and outcome at the population level and individual facility level. They can be used to measure patient safety, effectiveness of treatments, and patient and physician satisfaction; these are the measurements that will determine whether health care providers adopt QI initiatives or succumb to the quality paradox.

A common example of a collection of indicators is the Healthy People 2010 Leading Health Indicator list. A total of 29 indicators measure characteristics of patient care such as access to health care, immunization rates, physical and mental health, and substance abuse.³ Although these indicators are descriptive and can be useful for research purposes, they are rarely used by inpatient rehabilitation facilities for QI initiatives. Instead, other indicators have been developed specifically for these settings, such as those by RTI International, which measure respiratory status, balance, pain management, mood/depression, and change in functional outcomes.¹⁴ As previously mentioned, indicators can also be used to gauge patient satisfaction, such as part of the Medicare Current Beneficiary Survey (MCBS), which asks patients about the overall quality of medical services, out-of-pocket costs, and the ease of obtaining answers to questions about treatments and prescriptions.¹⁵

In addition to the Centers for Medicare & Medicaid Services (CMS), two major regulatory bodies in the United States publish indicators to measure quality of care. The first is the Agency for Healthcare Research and Quality (AHRQ), which has developed four lists of indicators that assess outcomes and can be measured using data collected from hospital administrative records. There are 32 inpatient quality indicators (IQIs), which measure mortality rates for medical conditions, surgical procedures, hospital and area-level utilization rates, and volume procedures. The 18 pediatric quality indicators (PDIs) are similar to the IQIs and are divided among provider-level and area-level indicators. The 27 patient safety indicators (PSIs) are used to identify potential adverse consequences of

treatment during hospitalization, whereas the 14 prevention quality indicators (PQIs) complement the IQIs to measure hospital admission rates for ambulatory care-sensitive conditions.^{16–19} The AHRQ quality indicators measure outcomes both at the population and facility level of rehabilitation services. The second body is the Commission on Accreditation of Rehabilitation Facilities (CARF), which is an international nonprofit accrediting agency. In addition to outcome quality indicators, CARF uses structure and process indicators to accredit inpatient rehabilitation facilities and other health and human service facilities. Accreditation requires a self-evaluation and an external survey, followed by a QI plan to address any issues recognized as part of the process.¹⁰

Quality indicators can be used for the multitude of factors that must be measured to adequately characterize the quality of care, especially in rehabilitation medicine. They can be used to measure the structure and process pieces of the Donabedian triad, including the effectiveness of multidisciplinary team members, knowledge and motivation required to actively participate in rehabilitation, and the responsiveness to changes in the long-term needs of patients and their families.¹¹ Another important measure of the quality of rehabilitation is change in functional outcomes, an indicator that is commonly assessed using the FIM™*. The FIM™ approximates burden of care and measures patient functioning for 18 activities of daily living (ADLs), comprised of 13 motor and 5 cognitive items, each of which is scored on a scale of 1 (*total assist*) to 7 (*complete independence*). Since 2002, CMS has implemented the use of the FIM™ as part of its Inpatient Rehabilitation Facility Patient Assessment Instrument (IRF-PAI).²⁰ By using the FIM™ to measure patient functioning both before and after rehabilitation, one can determine whether the objectives of a stroke rehabilitation program, for example, have been met. Change in the score of individual FIM™ items can also be used to measure progress in such areas as self-care, locomotion, communication, and patient satisfaction.⁵ Although as Berlowitz et al²¹ describe, FIM™ scores can be risk-adjusted by using function related groups (FRGs), their utility has some limitations. For example, these scores cannot be used as quality indicators for all facets of patient care, including quality of life, functional abilities in certain settings such as the workplace, and participation in other societal areas.

Measuring Disparities in the Provision of Rehabilitation Services

Other than measuring the quality of care provided in the rehabilitation facilities themselves, data gathered from measuring quality indicators are used to determine whether disparities exist in the provision of rehabilitation services. Studies of such disparities have looked at several demographic factors, such as race or ethnicity, geography, gender, age, socioeconomic status, education level, access to medical care, and disability status. However, the results of these studies have been mixed, and any conclusions drawn could not be applied to the broader rehabilitation patient population.

Race/ethnicity

In a study of racial disparities among stroke patients in inpatient rehabilitation facilities (IRFs), Putman et al²² showed no disparity in functional recovery among whites and African Americans during inpatient rehabilitation, after controlling for other patient characteristics such as age and gender. However, the results suggested that a disparity in functional outcomes resulted from differences that stemmed from patient characteristics either before or after admission to an IRF. In the study population, African Americans were found to have higher prevalence of hypertension and diabetes prior to stroke compared to white patients, and their average body mass index (BMI) was significantly higher as well. White patients,

*FIM™ is a trademark of Uniform Data System for Medical Rehabilitation, a division of UB Foundation Activities, Inc.

on the other hand, had a higher rate of prestroke employment and were functionally more independent, as measured by the FIM™. Therefore, these prestroke risk factors, in addition to varying access to poststroke long-term rehabilitation, resulted in different care trajectories. The authors concluded that these care trajectories could explain the racial disparity in functional outcomes, rather than the quality of the services provided in the IRFs themselves.²²

In a study of poststroke rehabilitation patients from the Northern California Kaiser Permanente System, Chan et al²³ found some evidence of racial disparities in access to care, but the data showed that Asians and African Americans had more outpatient rehabilitation visits than Hispanics, who had more than whites. This observation, however, may have been a consequence of the unique demographics of northern California when compared to the rest of the country. Similarly, research done by Ngo et al²⁴ in 2009 measured the use of physical therapy (PT) and occupational therapy (OT) in Medicare beneficiaries who had suffered a stroke, and the association with various demographic characteristics, including race/ethnicity. The authors found that Hispanic patients received more monthly PT than both white and black patients, but they also received less monthly OT than both groups. In addition, white patients received more OT than black patients. However, the authors also mentioned that these variations were not statistically significant.²⁴ Several other studies have also shown mixed results when measuring racial disparities in the provision of general rehabilitation services, but the lack of studies that look at stroke rehabilitation in particular has limited the utility of this information.

Age, gender, socioeconomic status, and education level

Although the effects of other demographic factors such as socioeconomic status, educational level, and access to medical care have not been studied as thoroughly as race, some research does exist that suggests trends in disparate access to rehabilitation services. In the study by Ngo et al²⁴ mentioned earlier, the authors found that after an incident stroke, older patients received more monthly PT compared to younger patients but they received less monthly OT. For both types of therapy, females received more than males, and patients who earned less than \$25,000 per year received more therapy than people who earned more than \$25,000 per year. As for education level, patients who had earned a high school diploma or less received more PT than people who had higher education, but education level did not affect the rate of OT use. Of all these results, however, the authors mentioned that the only statistically significant finding was that for monthly OT; earning less money makes a patient more likely to receive monthly therapy.²⁴

Although information on disparities in stroke-specific rehabilitation is scarce, trends seen in other areas of rehabilitation and medical services might be illustrative. Research by Chan et al²⁵ showed a strong correlation between lack of certain health maintenance procedures among female Medicare beneficiaries, such as Pap smears and mammograms, and higher prevalence of functional limitations. The study also showed that those beneficiaries who were part of a health maintenance organization (HMO) received more procedures for preventive care than those who were part of a fee-for-service plan and that patients who lived in long-term care facilities reported fewer such procedures compared to those living in the community. Asch et al²⁶ also studied the underuse of medical services in the Medicare population and determined that certain vulnerable populations were less likely than others to receive necessary and preventive care and had higher rates of avoidable outcomes. Because disparate functional outcomes after participation in a rehabilitation program could be due in part to preexisting medical conditions, trends in access to preventive care are important for characterizing varying rates of patients' success after they are admitted to an IRF. These vulnerable populations represent various factors, including race, socioeconomic status, living in health professional shortage areas (HPSAs), and living in poverty areas.²⁶

Studies of poststroke rehabilitation patients in the Northern California Kaiser Permanente System have yielded several important observations about disparate access to rehabilitation services. In addition to the racial disparities mentioned previously, Chan et al²³ found that higher age at acute care discharge, being female, being white, living in a rural or lower income area, and having a shorter acute length of stay were all traits associated with receiving less outpatient stroke rehabilitation. Similarly, Sandel et al²⁷ found that for inpatient rehabilitation services, older patients, women, and patients who had hemorrhagic stroke were less likely to receive services but were more likely to receive care at a skilled nursing facility (SNF). As with racial disparities, the results of studies into disparities resulting from gender, age, and other demographic characteristics have been inconclusive.

Geography

Few studies have looked at the geographical variation (rural/urban) in access to stroke-specific rehabilitation, however many studies have measured outcomes in various other medical fields and can be used to begin to form a picture of the disparities that exist. Studies have shown differences in the rate of generalist and specialist use among urban and rural residents, an important point considering rehabilitation is categorized as a medical specialty by most hospital facilities. In 2006, Chan et al²⁸ showed that among the Medicare population, patients in rural areas have fewer overall medical visits and see fewer specialists and more generalists than patients in urban areas. It was determined that patients in rural areas were unable or unwilling to travel great distances for medical care, often electing to go to a larger rural area rather than an urban area that offered more specialty care but was further away. In addition, the rural populace was more likely to depend on internists and family practitioners for the bulk of their medical care.

Lee and colleagues²⁹ examined the use of poststroke rehabilitation in the Medicare population and found significant differences in utilization based on geographic location. Using metropolitan statistical areas as the unit of analysis, these researchers found a 3-fold difference in the age, sex, and stroke type adjusted rates of inpatient rehabilitation admission. The percentage of stroke survivors admitted to a rehabilitation hospital varied from 10% in Tampa and Miami in Florida to 31% in Houston.

Disability status

In addition to racial, socioeconomic, and geographical groups, disabled patients are another group that often faces disparities in health outcomes and other measures of structure and process. This is of particular importance for patients who have suffered a stroke, more than 5 million of whom are living in the United States, most with some residual disability.⁵ In 2006, Iezzoni et al³⁰ found that disability status exacerbates existing health barriers in rural regions of the country and that many of the physicians in these rural areas do not understand disabled patients' specific needs. These patients in rural areas face several impediments to care, including the need to travel to urban areas for specialty (ie, rehabilitation) care even though transportation is often physically inaccessible. Many disabled patients are also on Medicaid or are uninsured and have difficulty finding primary care physicians in rural areas who are willing to accept them. Throughout focus group interviews, the authors observed that disabled patients perceived rural physicians and communities to be less sensitive to their needs and ability to access services, and these patients also had difficulty finding medical information on their own due to lower levels of education and lack of physical resources, such as the Internet. Iezzoni et al concluded that disabled patients in rural areas were more susceptible to health disparities because of many factors, such as poverty, less education, clinician shortages, and financially vulnerable medical practices that could not afford to care for these high-cost patients.

Disabled patients also face disparities in the structure and process of medical care. A study by Iezzoni et al³¹ in 2003 measured the satisfaction of disabled people with technical and interpersonal aspects of their care. The participants were community-dwelling, elderly Medicare beneficiaries. The vast majority of those surveyed thought their physician was competent, but they were also more likely to report that the physician had an incomplete understanding of their clinical history or disabling condition and a lack of thoroughness and communication skills. Overall, the authors found a disconnect between the perceptions and expectations of physicians and their disabled patients, when discussing the experience of disability and its implications for medical care.

Kirschner et al³² also discussed structural barriers faced by the disabled community, particularly environmental barriers such as lack of wheelchair ramps and high examination tables in doctors' offices. They found that these barriers affected the quality of care received and stigmatized and demoralized patients, discouraging them from utilizing medical services. In disparities similar to those of rural populations, female patients with mobility impairments were found to be less likely to receive preventive treatments such as Pap smears and mammograms. In addition, the authors found that adults with functional limitations account for a third of all physician visits, 62% of hospital-days, and 46% of health expenditures. In short, the authors concluded that it was time "to embrace bodily diversity," as much as we have embraced racial and cultural diversity in this country.

Iezzoni³³ espoused the frustration that many in the disabled community feel in a 2008 editorial. She cited the enormous public outcry over health disparities of racial groups but the lack of response for one of the largest minorities in the country—disabled citizens—who comprise nearly a sixth of the population of the United States. Few studies have focused on disparities in persons with disabilities, and nearly none in the field of stroke rehabilitation, where addressing disabling impairments is an integral part of the recovery process. Of the few studies that do address the issue, many use a narrow definition of disability, focusing on the medical model. Data from the Medicare Current Beneficiary Survey (MCBS) or the Social Security programs may provide information about a large portion of the disabled population, but these data can be skewed by representing the elderly and most severely disabled patients, respectively; they are not necessarily representative of the broader disabled community. According to Iezzoni, a better understanding of disability itself, including physical and social barriers, and other contextual factors is required before the reasons behind the disparity in access and outcomes of care can be understood.³³ From studying access to rehabilitation services in general and poststroke rehabilitation in particular, it is therefore evident that disparities are the result of multiple factors relating to structure, process, and outcome rather than a single demographic factor such as race or gender.

Moving Forward With Quality Improvement

There have been a multitude of entities that have concerned themselves with measuring quality in the field of rehabilitation—professional organizations such as the American Medical Rehabilitation Providers Association (AMRPA) and the American Academy of Physical Medicine and Rehabilitation (AAPM&R), accrediting organizations such as The Joint Commission and the Commission on Accreditation of Rehabilitation Facilities (CARF), individual facilities and physicians, and the government. These groups however, may bring different goals to the table, such as business organizations concerned with cost, accrediting agencies that monitor quality of care, and other groups that promote patient safety. The goal should be to get all the stakeholders moving toward the same goals of improving the quality of care without neglecting to address health disparities and patient safety issues. These QI initiatives must be scientifically driven, continuing the trend toward

evidence-based practice in medicine, instead of following what is most cost-effective or what conforms to the conventions of expert opinion. Future QI initiatives must also remain flexible, because the science of quality improvement is an ever-changing field. The current push for electronic medical records might enable a nimble system, allowing quality to be monitored in real-time and allowing changes to be made when indicated.

In addition to measuring quality, great strides have been made over the past decades in recognizing the importance of measuring certain aspects of functioning. This was spurred by the publication of the *International Classification of Functioning, Disability and Health* by the World Health Organization in 2001. However, the rehabilitation community must now move further and begin to study all aspects of function, not just body functions and structures. In particular, greater emphasis should be placed on the participation domain when measuring outcomes of rehabilitation treatments. In 2007, Salter et al³⁴ sought to understand the impact of rehabilitation interventions on a patient's ability to participate in societal roles after a stroke event. The authors found that although the number of outcome assessments that included participation had increased over time, the participation domain was still only measured in 5.4% of the outcomes and only 5.8% of outcomes measured contextual factors. One of the main goals of rehabilitation providers is to maximize participation, but this cannot be verified nor improved unless participation is measured. Measurement of outcomes relating to body function and body structure is also important to rehabilitation management, but activities, participation, and other contextual factors should be included to gain the bigger picture of recovery.

Studies have looked at various aspects of QI programs, but further research is required in order for the field to progress. A well-designed QI initiative should provide valuable insights for research and, similarly, research in the field should inform new QI projects. In addition to measuring outcomes of care, methods to develop variables measuring structure and process must be explored. Structures, processes, and outcomes are interrelated, and all three facets of care must be addressed to improve quality. Disparities in access to rehabilitative services and disparities that specifically affect stroke patients must also be studied further. It is only after understanding the complex multitude of factors that affect medical care, both demographic and societal, that these issues can be addressed and eventually eliminated. Once quality issues and disparities have been identified, the challenge will be to find ways to implement the changes required. The quality paradox is a real phenomenon, and physicians and other health care professionals will need to be convinced that quality improvement initiatives are indeed a worthwhile investment of their limited time and resources.

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Table 1

Examples of quality indicators to evaluate structure, process, and outcomes

Structure	<ul style="list-style-type: none"> • Availability and appropriateness of space, equipment, and facilities • Human resources (education, training, experience, staffing ratio) • Sociodemographic and medical characteristics of patients
Process	<ul style="list-style-type: none"> • Maintaining life and preventing conditions that endanger it • Preventing secondary disabilities and complications • Discharge planning and arranging for continuing care
Outcomes	<ul style="list-style-type: none"> • Change in functional status • Ability to return to pre-event dwelling and successful work involvement • Involvement in leisure, recreational, and other social activities

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