State of the Science on Postacute Rehabilitation: Setting a Research Agenda and Developing an Evidence Base for Practice and Public Policy—An Introduction

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The growing population of older adults who sustain strokes, hip fractures, joint replacements, and other conditions, combined with the Medicare program’s inpatient prospective payment system and the technical advances in medical and surgical care, have led to an increasing demand for medical rehabilitation services. Medical rehabilitation provides crucial services that help people with chronic illness and disability live as independently as possible. In inpatient rehabilitation facilities, physician-coordinated, multidisciplinary teams focus on reducing impairments, enhancing independence in daily activities and quality of life, and minimizing caregiver burden. As documented in a recent Medicare Payment Advisory Commission (2006) report, the health care industry has responded to greater demand by increasing the number of hospital and skilled-nursing-facility beds as well as the number of therapists and nurses providing home health services.

Over the past 20 years, the cost of postacute care (PAC) services, including postacute rehabilitation services, have grown much faster than inflation, reflecting an increased demand for services and growth in number of providers. The U.S. Congress passed a series of laws (e.g., Balanced Budget Act of 1997, Balanced Budget Refinement Act of 1999, Deficit Reduction Act of 2005) intended to reduce Medicare’s PAC expenditures by establishing and refining prospective payment systems for rehabilitation hospitals, nursing homes, long-term-care hospitals, and home health agencies.

Changes in payment mechanisms alter providers’ incentives and indirectly affect the organization and availability of PAC. The consequences of new payment mechanisms on Medicare beneficiaries’ access to high-quality rehabilitation services, independence, and quality of life are unknown; consequently, research into access to, orga-
nization of, and effectiveness of rehabilitation services is needed.

Research on rehabilitation-focused health services has concentrated on patients’ natural recovery in single types of rehabilitation settings—rehabilitation hospitals and units, skilled-nursing facilities, long-term care hospitals, and home health agencies. It often is too expensive and unfeasible to evaluate costs and benefits of rehabilitation across sites of care, let alone specific paths of care, such as from hospitals to nursing homes to home. We know that most patients’ functional independence improves during rehabilitation, but we know little about the “active ingredients” of rehabilitation and which types of patients are best suited for which setting so that optimal outcomes are achieved at a reasonable cost.

Comparing outcomes across postacute settings has been hampered by the lack of a common outcome assessment instrument across settings, or a crosswalk between the instruments used by rehabilitation hospitals, skilled-nursing facilities, long-term care hospitals, and home health agencies. Imagine our confusion if Maryland’s weights and measures differed from those in California and Illinois and Texas and we had no way to convert their measures. With only a bit of hyperbole, this is the situation the Medicare program is in as it attempts to evaluate the relative effectiveness and cost effectiveness of rehabilitation hospitals, nursing homes, long-term care hospitals, and home health agencies.

In the absence of scientific evidence and a way to compare outcomes across settings, the Centers for Medicare and Medicaid Services (CMS) has promulgated rules that limit access to inpatient rehabilitation facilities. The so-called “75% rule” and Medicare fiscal intermediaries’ “local coverage determinations” are based on expert opinion but on a dearth of scientific evidence. In developing these regulations, Medicare was dependent on anecdotal information. Although the 75% rule was written to distinguish rehabilitation hospitals and units from acute-care hospitals, Medicare revised inpatient rehabilitation facility regulations to require explicit documentation of medical necessity and adopted the 75% rule to limit the types of patients admitted. Beneficiaries’ access to rehabilitation services could suffer if the truism that “the absence of evidence of effectiveness does not imply evidence of absence of effectiveness” is not recognized.

The need for expanded rehabilitation-focused health services research was addressed during a workshop in 2005 that was sponsored by the National Center for Medical Rehabilitation and Research (NCMRR) within the National Institute of Child Health and Human Development (NICHD) and the CMS (NICHD, 2005). Participants identified several research priorities, including a randomized controlled trial of rehabilitation contrasting inpatient rehabilitation with skilled-nursing home rehabilitation for patients with hip fractures. Also identified was the need for research into intensive rehabilitation for patients with major joint replacements or with cardiac and pulmonary conditions. Participants also called for studies to better characterize rehabilitation facilities. The director of NICHD, Duane Alexander, MD, promised to seek funding for targeted initiatives but said that he thought providers might have to provide protected time for investigators to participate in trials and help collect data for such a study. He noted that providers could conduct their own small population studies without waiting for federal funding. The need for additional research that would inform health policy was stated clearly.

**Symposium Planning**

The Rehabilitation Research and Training Center on Measuring Rehabilitation Outcomes and Effectiveness, funded by the National Institute on Disability and Rehabilitation Research (NIDRR), was asked to lead the planning for what became the Symposium on Post-Acute Rehabilitation. The symposium was guided by a planning committee (see “Acknowledgments”) with representatives from the American Academy of Physical Medicine and Rehabilitation, the American Congress of Rehabilitation Medicine, the Association of Academic Physiatrists, the Foundation for Physical Medicine and Rehabilitation, the American Hospital Association, and the Federation for American Hospitals. The same organizations provided financial support. The American Medical Rehabilitation Providers Association provided major financial and staff support. Additional sponsors included the American Physiatric Education Council, CARF International (formerly the Commission on Accreditation of Rehabilitation Facilities), Casa Colina Centers for Rehabilitation, eRehab Data, Fowler Healthcare Associates, HealthSouth Corporation, IT Health Track, Johns Hopkins University Department of Physical Medicine and Rehabilitation, Kessler Institute for Rehabilitation, Moss Rehabilitation Hospital, Metro-Health Rehabilitation Institute of Ohio, the Rehabilitation Institute of Chicago, and UDSInc.

The symposium’s goal was to serve as a catalyst for expanded research efforts on PAC rehabilitation so that relevant findings can be used as the basis for policy and funding decisions. The planning committee sought to develop a research agenda that supports an evidence base for PAC rehabilitation, including issues related to measurement and research design, access to PAC rehabilitation services, organization of rehabilitation services, and outcomes attained for beneficiaries of Medicare and other insurers. The objectives were:

- To describe the current knowledge about utilization, organization, and outcomes of postacute rehabilitation settings;
- To identify methodologic and measurement challenges to conducting research in this area;
- To foster the exchange of ideas among researchers, policymakers, industry representatives, funding agency staff, consumers, and members of advocacy groups; and
- To identify critical questions related to setting, delivery, payment, and effectiveness of rehabilitation services that are of the highest priority for investigation.

The activities of the symposium were designed to formulate a research and policy agenda and to stimulate policy discussions, to engage stakeholders who are involved in policy decisions, and to emphasize the need for an evidence base for rational policymaking. Symposium organizers sought balance through the perspectives of key stakeholders, including Congress, CMS and private insurers, providers of rehabilitation services,
patients and their advocates, and health service researchers.

The planning committee invited research and policy leaders to present plenary and track-specific state-of-the-science summary speakers and rehabilitation researchers to provide reports on contemporary work funded by the American Medical Rehabilitation Providers Association, the Rehabilitation Research and Training Center, and other agencies. The planning committee invited three keynote speakers: former Senator Robert Dole; Laurence Wilson, director, Chronic Care Policy Group, CMS; and Steven Tingu, director, NIDRR. Four plenary speakers were invited to address each of the track themes and develop articles for publication. Articles by Duncan and Velozo (2007) on measurement and methodologies, Buntin (2007) on access, Kaplan (2007) on service organization, and Kane (2007) on effectiveness were developed for the symposium.

Four articles were commissioned to summarize the state-of-the-science and to provide commentary on the 24 work-in-progress presentations given at the symposium. Authors were Johnston, Graves, and Greene (2007) on measurement and methods; Ottenbacher and Graham (2007) on access; Chan (2007) on service organization; and Prvu Bettger and Stineman (2007) on effectiveness.

The more than 270 participants represented 166 organizations, including the U.S. Congress, CMS, NIDRR, NCMRR, private insurers, providers of rehabilitation services, patients and their advocates, and health researchers located primarily in academic institutions. They attended presentations by the three keynote speakers, the four plenary speakers, and four concurrent breakout presentations on works in progress that were facilitated by assigned leaders and reporters. In addition, 20 peer-reviewed poster presentations summarized recently completed research.

The breakout sessions also included 4 state-of-the-science summaries by leading researchers plus roundtable discussions that were intended to ensure that all participants had input to the process. Discussion leaders explained that the purpose of the discussions was to help generate reports to all participants that would identify problems and proposed solutions within each specific topic. Each breakout group then formulated research recommendations designed to increase knowledge about how to organize and deliver effective rehabilitation services.

On the symposium’s second day, Barbara Gage, PhD, the principal investigator for the Deficit Reduction Act of 2005’s Post Acute Care Demonstration project, described work under way to develop a common patient assessment instrument and study PAC payment reform for CMS (Gage, 2007).

Recommendations for future research developed by the work groups were reviewed during a general session. The reporters (Patrick Murray, Dexamne Clohan, Joy Hammel, Elizabeth Durkin) and discussion leaders (Bruce Gans, Greg Worsowicz, Dan Graves, John Whyte) summarized the recommendations, which appear as the final report in the series (Clohan et al., 2007).

The remainder of this summary encapsulates key points from the plenary and state-of-the-science presentations followed by the track-specific research recommendations.

**Measurement and Methodology**

Patient assessment data are collected in three of the four PAC settings. Skilled nursing facilities use the Minimum Data Set 2.0, home health agencies use the Outcome and Assessment Information Set, and inpatient rehabilitation facilities use the Inpatient Rehabilitation Facility Patient Assessment Instrument, which includes the FIM instrument. Long-term care hospitals do not have a mandate to use an assessment instrument. Although these instruments include similar items, the item definitions and assessment periods are different. Moreover, for the functional assessment domain, all three instruments were designed with a fixed set of items, regardless of relevance.

In their plenary session, Duncan et al. (2007) called for the development of clinical measures that are precise and sensitive to change across a wide range of patients, are retrievable in electronic medical records, and assess clinically relevant outcomes. Johnston et al. (2007) called for a method of grading the strength of evidence for and validity of PAC measures. Evidence is needed to support measures’ content validity, reliability, internal structure validity, sensitivity to change, and predictive validity for outcomes or decisions (criterion-oriented validity). The development of a common assessment instrument across PAC providers will facilitate research, but issues regarding the timing of data collection may remain because treatment phases intersect at varying points with a patient’s recovery trajectory. Measurement of rehabilitation interventions was regarded as a major topic and was acknowledged to be the “weakest leg of the stool,” whether the focus is specific treatment content or measures of organizational structure, process, or communication. Participants expressed an urgent need to develop validated measures that would allow rehabilitation to be judged.

Research priorities suggested by the measurement and methodology track participants included development of validated measures of rehabilitation treatments, development of stronger cognitive and psychosocial outcome measures, development of long-term outcomes measures, development of robust severity and selection adjusters across the PAC rehabilitation patient population, assessment of the role of environmental factors on patient outcomes, and continuing development of evidence-based treatment guidelines.

**PAC Access**

Buntin (2007) identified key concerns related to PAC access, including reduced access to care for complex cases, delivery of inappropriately low intensities of care, premature discharges, and provision of care that may be unnecessary. Yet, evidence is lacking about which provider and treatment intensities are appropriate for specific patients. A few studies have examined the use of PAC for patients with hip fracture or stroke. They found wide variation in utilization across geographic regions, which likely reflects practice styles, the supply of services, local practice regulations, and substitution of services across sites. Ottenbacher and Graham (2007) suggested that potential indicators of access to rehabilitation services may be classified into four types of barriers: financial, structural, personal and sociodemographic, and attitudinal. This framework may be used to monitor access to PAC rehabilitation services.

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Research priorities related to access include projecting the PAC needs of the population and determining the range and geographic distribution of existing PAC providers. Research should be directed toward obtaining a better understanding of how access is influenced by attributes about family dynamics, social support, and cultural differences as well as assumptions about the value of improvement for a patient who will not achieve complete independence.

**Care Processes Across PAC**

Kaplan (2007) described how the Medicare Payment Advisory Commission uses six indicators to assess payment adequacy for the four PAC sectors: beneficiaries’ access to care, supply of providers, utilization volume, quality, providers’ access to capital, and payment costs. In 2006, all indicators suggested adequate payments for all four sectors. In 2007, however, all indicators suggested adequate payment for home health agencies; all indicators but quality were favorable for skilled-nursing facilities; all long-term-care hospital indicators were favorable, except for a drop in the Medicare margin from 2005; and inpatient rehabilitation facility indicators were mixed.

Chan (2007) described how postacute rehabilitation care is fragmented into four “silos” based on provider type. This lack of integration provides disincentives for delivering the most cost-effective sequence of postacute services. Each provider type has a unique Medicare payment system with unique incentives. For example, skilled-nursing facilities and home health agencies have strong incentives to provide rehabilitation services, whereas inpatient rehabilitation facilities and long-term-care hospitals have incentives to reduce their average length of stay. Little research has investigated the impact of Medicare’s payment system policies on PAC services, and those policies continue to evolve. The goal in PAC should be to provide the right “dose” of care to the right patient at the right time in the right place.

Participants in the track that focused on processes of care suggested that future research include randomized trials that test individual components of PAC to determine optimal intensity, duration, and frequency of interventions. To overcome the current barriers to conducting research across provider types, the experiences of other health care systems, such as the Department of Veterans Affairs and Kaiser Permanente, should be examined.

**PAC Rehabilitation Effectiveness**

Kane (2007) discussed several issues related to the effectiveness of PAC, including outcomes that are a function of baseline status, patient clinical characteristics, demographic characteristics, and treatments. He also contrasted pay-for-performance systems based on process indicators (e.g., guideline adherence) with case-mix adjusted outcome and asserted that rehabilitation activities that have yielded improvements in quality-adjusted life years should be encouraged. Prvu Bettger and Stineman (2007) described how randomized controlled trials are not appropriate for investigating all areas of rehabilitation; well-designed nonrandomized trials can advance our knowledge base. The Transparent Reporting of Evaluations With Non-Randomized Designs statement may help improve the quality of effectiveness research. Prvu Bettger and Stineman (2007) recommended that well-designed, nonrandomized designs be used to complement randomized designs to study actual clinical practice.

Participants in the group that explored effectiveness suggested that future research focus on what kind of treatment, or combination of services, is most effective in achieving specific outcomes for whom across the continuum of care. In addition, better measures of PAC rehabilitation treatments are needed so that key contents or treatments are identified and can be studied systematically and compared across the PAC continuum. Participants expressed a strong need for a strategic research plan that is shared by payers, providers, organizations and agencies that fund research, and the researchers. Such a plan would have a common measurement time period and would call for collaboration among the CMS, the National Institutes of Health, the NIDRR, and the research community to provide flexibility within rigorously designed research protocols, because the prospective payment system itself is a primary obstacle to treatment innovation.

**Summary**

Postacute rehabilitation care is a key component of the health care delivery system, yet we know little about the active ingredients of the rehabilitation process that produce the best outcomes. Well-designed research is needed to develop better measures for case-mix adjustment and outcomes of care. To advance research into rehabilitation effectiveness and support the development of evidence-based policies, we must develop new and improve existing measures of patient characteristics, treatment contents, and long-term outcomes. Critical research needs to include:

- Developing validated measures of rehabilitation interventions and case mix;
- Standardizing PAC measures and timing of routine measurement for payment and quality assurance purposes across sites of care;
- Examining differences in content and processes of care both within facilities of the same type and across the different types of facilities;
- Identifying patient characteristics that vary by region such as rural and urban mix, cultural characteristics, and provider referral patterns; and
- Implementing a strategic plan for effectiveness research that is characterized by collaboration among CMS, federal research funders, researchers, and care sites.

The content developed for and derived from the symposium is published in the November 2007 issue of Archives of Physical Medicine and Rehabilitation. Additional symposium information is available at www.foundationforpmr.org/programs/postacuterehab.html. The organizers and sponsors of this symposium trust that their goal of catalyzing expanded research on PAC rehabilitation is furthered by the publication of this set of articles. We look forward to the benefits of greater research attention to improved measurement and research design; access to PAC rehabilitation services; organization of rehabilitation services; and outcomes attained for patients, taxpayers, and Medicare and other insurers. Our nation’s health policy requires a solid base founded on compelling evidence. ▲
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