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Dear Colleagues,



“Value in healthcare” is the buzzword as our nation proceeds toward full implementation of healthcare reform. If value is measured by outcomes and costs, then rehab professionals are in a good position to participate in the conversation. Among all medical specialties, our small specialty has long been a leader in outcomes measurement. In regard to cost, Cleveland Clinic data show that 45 percent of the one-year cost associated with all hospitalization episodes lies in the post-acute environment, where rehab services are the coin of the realm. Value in healthcare is at the top of our department’s agenda, and it’s been there long enough to have yielded notable dividends, as reflected in several contributions to this year’s issue of *Frontiers in Rehabilitation*.

Consider the article on page 9 profiling 6 Clicks, our new electronically administered short-form functional outcome measure adapted from Boston University’s Activity Measure for Post-Acute Care™. The goal of 6 Clicks is to provide a quick and relevant means of measuring patients’ function in the acute hospital. 6 Clicks has already helped us ensure that our therapists spend more time with the patients who need them most. We are now collaborating with researchers from Boston University and the University of Vermont to quantitatively confirm 6 Clicks’ clinical relevance, including its utility in guiding discharge of patients to the setting best suited to their rehab needs.

Additionally, the article on page 14 spotlights testing of the new Cleveland Clinic Multiple Sclerosis Performance Test app as a means to enable frequent, cost-effective assessment of functional performance and improve disease management. Similarly, on page 20 we profile studies we have underway to assess the value of innovative distance learning interventions that promise to affordably enhance patient self-management in a number of disabling conditions. On page 6 we share details of the Cleveland Clinic Spine Care Path, an evidence-based clinical road map for reducing needless, and often costly, variation in the management of spine pain across the care continuum. I’m proud that our PM&R physicians and therapists played a key role in the care path’s development.

Healthcare value involves far more than reducing cost. The greatest value for patients always lies in delivering the highest-quality medical care tailored to their individual needs. We touch directly on that aspect of the value equation in the cover story on our experience providing inpatient rehab for patients following ventricular assist device implantation and in the article on page 16 detailing the progress of our Cancer Rehabilitation Program.

I’ve learned that measuring costs is an enormously complicated matter. In healthcare, indirect expenses and cost-shifting make for an accounting quagmire. There can be a tendency to fall back on “hamster wheel” tactics — fill the beds and see more patients in less time. A focus on outcomes is easier for us. For us, success doesn’t mean normalizing lab values or improving pain scores; it means returning a patient back to work or independent living. We have a long way to go if we all are to become value-driven providers, but the shift in focus should be a little easier for physiatrists than for other specialists.

A handwritten signature in black ink that reads "Fred Frost".

Frederick S. Frost, MD

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Frontiers in Rehabilitation, published by Cleveland Clinic’s Department of Physical Medicine and Rehabilitation, provides updates on diagnostic and therapeutic techniques and current research for physiatrists, neurologists and neurosurgeons.

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Inpatient Rehab for Patients with Ventricular Assist Devices: Experience and Insights

By John Lee, MD; Eiran Gorodeski, MD, MPH; and Kelly Walters, CNP

The rising prevalence of end-stage heart failure in the United States has translated to an increase in the number of patients awaiting heart transplant. Due to the limited supply of donor organs, use of ventricular assist devices (VADs) — as either a bridge to transplantation, a bridge to recovery or destination therapy — has been increasing as well. Cleveland Clinic has an active VAD program, with 59 VADs implanted in 2012. Of the 59 patients who received those VADs, 47 were able to be discharged home, 10 were discharged to our inpatient rehabilitation facility (IRF) on Cleveland Clinic's main campus and two were sent to a skilled nursing facility.

Recent Rehab Experience by the Numbers

Patients who undergo VAD implantation often become deconditioned as a result of multiple medical issues and long hospital stays. Most require varying levels of post-operative rehabilitation care. Treatment of VAD patients in the IRF on Cleveland Clinic's main campus began in 1998. Over the past 12 months, we accepted 17 patients, of whom 13 were discharged to the community and four required readmission to the acute-care hospital. The average length of stay was 16.4 days (range, 4 to 34), and the average change in Functional Independence Measure (FIM) score was 22.5.

Training and Preparation

Treatment of VAD patients requires extensive staff education. All nurses, therapists and physicians at our main campus rehabilitation hospital recently underwent training or retraining over a six-month period to learn about the following:

- The VAD hardware
- The various alarms and how to respond to them
- How to change the battery and connect to a power source
- Mobility issues with the VAD
- Activity precautions



A VAD patient is guided through exercise therapy in the inpatient rehabilitation unit.

- Driveline care
- Potential medical complications

Additionally, clear lines of communication are established between the rehabilitation team and the VAD team.

Experience Breeds Success

Our experience with VAD patients has been very positive. Most of these patients have achieved significant functional gains and been able to be discharged to the community. Nevertheless, caring for these patients poses challenges, which include the need for close monitoring of their blood pressure and cardiac and fluid status, vigilance for potential medical complications, and thorough patient training and education prior to discharge to the community. The medical



Dr. Lee with a VAD patient in the inpatient rehabilitation unit

complications we have seen in these patients include bleeding, infections, thrombus of the VAD and stroke.

Throughout the rehab course, the VAD team remains peripherally involved, frequently consulting with the rehab team on management and discharge planning issues. Initial staff trepidation about caring for VAD patients quickly dissipates as our comfort level rises with increased knowledge and experience in caring for these patients. The rehab physicians and nurses have become accustomed to managing patients' medical issues with support from the VAD team; the therapists have become proficient in mobilizing and exercising these patients; and the case managers and psychologists have gained familiarity with addressing the psychosocial and discharge considerations unique to this population.

On the acute-care hospital side, all patients are seen after VAD implantation by a physical and occupational therapy team dedicated to cardiovascular patients, and the physiatrist is consulted on many of these patients as well.

Future Directions

As our experience with VAD patients continues to grow, we encourage closer and earlier involvement of the PM&R consult service following VAD implantation to facilitate transfer to the next appropriate level of care. The goals of changes along these lines would be to improve throughput and accelerate admission of appropriate patients to inpatient rehabilitation. We are also using our electronic medical record branching logic to standardize therapy approaches and goals across the acute and post-acute arenas, and we are measuring patients' changes in strength, endurance and balance in addition to FIM score changes.

A Gratifying Patient Population

VAD patients are medically complex but are a very gratifying population to treat on the inpatient rehab unit. As a result of multiple medical comorbidities, they have complex rehabilitation needs and are able to make rapid, meaningful functional gains if medical stability is maintained (see sidebar on next page). In many cases (e.g., stroke, critical illness neuromyopathy, peripheral neuropathy) these patients qualify under the Centers for Medicare and Medicaid Services' 60 percent rule.

More than most other patient populations, VAD patients require the resources of the entire interdisciplinary team working toward the goal of discharge back to the community. When such discharges are made possible, it is a testament to the high degree of coordination among team members and to the immense value inpatient rehabilitation can yield in this population. ■

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KEY POINTS

Successful rehabilitation of VAD patients requires adequate training of the interdisciplinary team, awareness of these patients' concerns and specific management issues, and close collaboration with the VAD team.

As a result of multiple complex, intercurrent medical conditions, VAD patients have clear rehabilitation needs and are able to make rapid, meaningful functional gains if their medical stability is maintained.

Inpatient rehab care for VAD patients requires close monitoring of patients' cardiac status, blood pressure and fluids; vigilance for potential medical complications; and thorough patient education before discharge.

CASE STUDY

Care Coordination Overcomes Initial Complications in Acute Rehab

A 67-year-old man arrived from out of state for a second opinion on management of his heart failure, including the option of heart transplantation. Before he could return home, his condition deteriorated, and he was admitted through the emergency department. Workup showed severe left ventricular dilation and an ejection fraction of 10 percent. He subsequently had a HeartMate II® LVAD placed as a bridge to transplant.

A Rocky Postimplant Course

His course following VAD placement was complicated and lengthy. He developed respiratory distress, with difficulty weaning from the ventilator, requiring a tracheostomy for a period. Medical management included treatment of pneumonia, *Clostridium difficile* infection and malnutrition as well as the need for anticoagulation due to the VAD, pre-existing factor V Leiden deficiency and deep vein thrombosis.

The patient remained with the VAD service for nine weeks, after which he was admitted to the acute rehabilitation unit with severe muscle weakness, decreased endurance and dysphagia. He was dependent to maximum assist for all activities of daily living (ADLs) and mobility.

Medical Limitations Trump Motivation

During this acute rehab stay, which lasted four weeks, the patient was motivated to participate but limited by progressively worsening dyspnea. The VAD team continued to follow him closely, and an echocardiogram demonstrated distension of the left ventricle without unloading. This finding, along with an elevation in serum lactate dehydrogenase, was consistent with pump thrombosis, so he was readmitted to the acute-care hospital, where he underwent exchange of the thrombosed VAD.

Swift Progress After Stabilization

After a four-week stay in the acute-care hospital, the patient was readmitted to the acute rehab unit. During this admission, his functional progress was rapid, and he was discharged home after two weeks. Arrangements were made with local providers for transition of care back home. Two months after discharge, the patient reported independence in all ADLs and mobility and was able to ambulate short distances in the community with a rolling walker. ■

The Spine Care Path: Reducing Practice Variability in Partnership with PM&R

By Daniel Mazanec, MD, and Ian Stephens, PT, DPT, OCS

Despite increased spending for spine care and a steep rise in the use of imaging and interventional and surgical procedures, the functional outcomes of spine treatment have not improved. Though there is broad consensus among multiple evidence-based clinical practice guidelines for back care, variability in the diagnosis and treatment of spinal disorders remains extreme.

To reduce this needless and often costly variability and improve patient outcomes, Cleveland Clinic's Center for Spine Health has developed the Cleveland Clinic Spine Care Path. As physical therapy and rehabilitation medicine play a key role in the spine care continuum, members of the Department of Physical Medicine and Rehabilitation have made important contributions to the Spine Care Path's development and implementation. These include guidance

on all the points in the spine care continuum where nonsurgical treatment is encountered.

Care Path at a Glance

Developed with input from medical spine specialists, spine surgeons, physical therapists and pain management physicians, the Spine Care Path is designed to provide an evidence-informed clinical road map to assist practitioners in managing the full range of spinal disorders. The care path begins with work flow diagrams outlining the progression of evaluation and management across the continuum from acute through chronic symptoms, incorporating medical, interventional, surgical, psychosocial and rehabilitation components. Figure 1 presents a portion of the care path's work flow for low back pain, focusing on the acute and

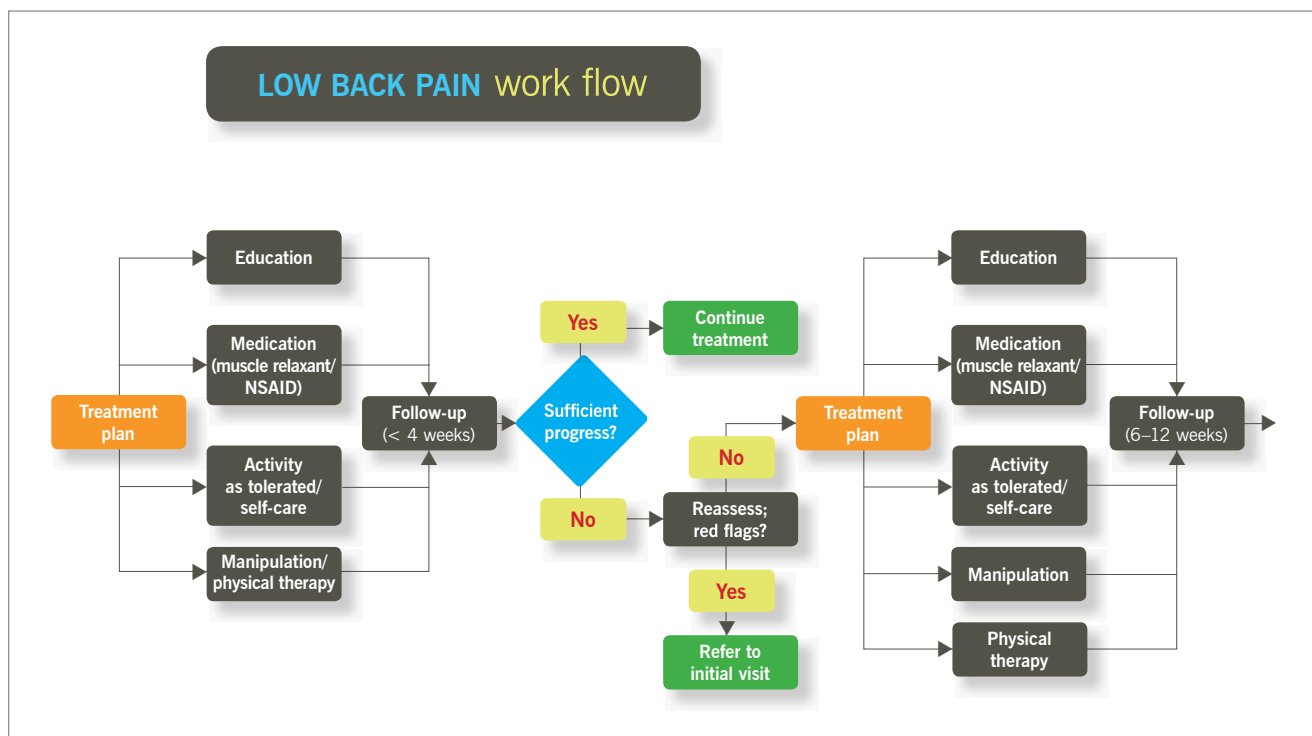


Figure 1. Excerpt from the Spine Care Path's work flow for low back pain. This portion covers initial stages of management.

subacute phases. Similar work flows have been developed for neck pain and radicular pain.

These work flows are supplemented by narrative care path “guides” designed as clinical manuals for use by the practitioner. They succinctly describe in useful detail the appropriate steps in patient management with supportive rationales and evidence.

Sharpening the Value Focus

Development of the Spine Care Path has led to a sharper focus on measuring the value of care, including both patient outcomes and clinical process. It will succeed only if it is continually refreshed and refined using the outcomes data collected, so that the care path becomes a “living organism” of sorts.

The care path delineates a detailed timeline for delivery of care across the spectrum of symptoms, raising important questions about the organization of the spine care delivery system. Such questions loom ever larger with the mounting national imperative to focus on high-quality, value-based care for populations. The care path serves as the organizing principle for realigning our services to provide the highest-quality care in a timely manner to patients at all points along the continuum.

Among the issues we are addressing is the need to match appropriate clinicians to patients at various stages of care. For example, acute back pain is common and generally resolves with simple therapy. For patients without red flags, imaging is rarely required. Providing such patients prompt access to care with back education and recommended activities to try may be best achieved using physical therapists or nurse practitioners as entry-level providers. When back pain persists, the care path defines when referral to medical spine specialists, spine surgeons or behavioral health providers is indicated.

Embedded in the EMR for Continuous Improvement

The Spine Care Path also presents an ideal opportunity to develop a continuous quality improvement model for spine care. By capturing patient outcomes in various domains — including pain, function and mood — as well as defined process measures such as imaging use and appropriate referrals, the care path is designed to provide information on the clinical effectiveness of treatment.

What's in the Care Path's Physical Therapy 'Bolt-On'?

- A standardized approach to screening for red flags and managing them
- Guidance on using validated instruments to identify yellow flags, or factors that suggest complicating psychosocial barriers to recovery
- Guidelines and decision-making support for physical therapists to allow treatment-based subgrouping of patients for matching with evidence-based interventions
- Recommendations for appropriate frequency and duration of physical therapy for each subgroup

The ability to capture and analyze these data and modify care as required is facilitated by integration of the care path into the electronic medical record (EMR). Important clinical data elements have been identified for inclusion in structured documentation to be embedded in the EMR. These retrievable data sets will facilitate retrospective study of the process, the cost of an episode of care and its impact on clinical outcomes.

'Bolt-Ons' Offer Added Physical Therapy Detail

Ongoing evolution of the Spine Care Path includes extending, refining and standardizing treatment limbs such as physical therapy and surgical care through what we're calling “bolt-ons” to the original work flow algorithms.

The physical therapy bolt-on is being developed by a group of Cleveland Clinic physical therapists to promote a standardized, evidence-based approach to physical therapy for managing back pain (see sidebar). The bolt-on addresses the breadth of physical therapy approaches to spinal disorders and emphasizes active interventions including core strengthening, manual therapy, aerobic conditioning and directional preference exercises. It will provide guidelines

for physical therapists to assign patients to treatment-based classifications to ensure that they receive interventions supported by evidence.

Whereas the above bolt-on addresses the approach to physical therapy in the acute and subacute phases of back pain management, the surgical bolt-on details the role of PM&R following complex spine surgeries, in both inpatient and skilled nursing settings. ■

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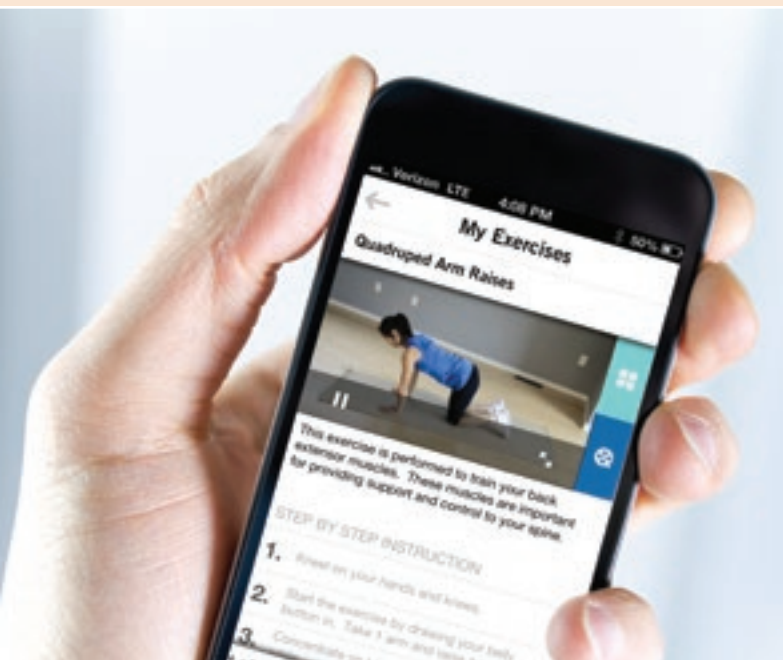
KEY POINTS

The new Cleveland Clinic Spine Care Path is an integrated collection of algorithms and narrative guides developed as an evidence-informed clinical road map for managing the full range of spinal disorders.

The care path is designed to be embedded in the EMR and serves as a framework for defining the best mix of providers and services to optimize value and patient outcomes across the spine care continuum.

Physical therapists and PM&R physicians have been intimately involved in the care path's development and implementation, including creation of detailed treatment limbs on physical therapy and postsurgical care.

Success of the care path is linked to a process of continuous refinement based on real-time outcomes data, making the care path a sort of "living organism."



A Smartphone Companion to the Spine Care Path

The Cleveland Clinic Spine Care Path will soon be complemented by a new Cleveland Clinic smartphone application (working name: MySpine) that patients with acute back pain can use as a self-care tool in the early stages of care management (in the absence of red flags). The app, developed for the iOS and Android operating systems, includes:

- Educational content about back pain
- Tools for daily pain monitoring and incident reporting
- Videos and images demonstrating recommended exercises
- A post-exercise survey
- Data reports for progress assessment
- Tools for appointment scheduling and clinician messaging

Because physical therapy is a key treatment option in the early stages of back pain management, Cleveland Clinic physical therapists played a major role in development of the app, which is currently in beta testing.

Bridging Academics and Clinical Rehab: Research Collaboration Sizes Up the Relevance of 6 Clicks Tool

By Matthew Plow, PhD; Frederick S. Frost, MD; and Diane Jette, PT, MS, DSc

Translational research is typically defined as the process of making basic science or laboratory science findings applicable to the improvement of human health and function. Many experts have argued for the need to conduct such translational (bench-to-bedside) research, and it is now a funding priority for the National Institutes of Health. Lost in these arguments, however, is recognition of the additional need to make patient-oriented research (i.e., conducted with human subjects) translatable to the realities of health-care and public health services.

Cleveland Clinic is trying to address this need through a pair of electronically administered short-form functional questionnaires we call the “6 Clicks” tool — named for the six questions contained in each of the questionnaires. Designed as a practical tool for quickly measuring patients’ functional status in the acute care setting, 6 Clicks is now being evaluated by Cleveland Clinic in a patient-oriented research collaboration with Boston University and the University of Vermont to assess its potential to support clinical decision-making in real-world practice.

Feasibility Needed in Patient-Oriented Research

When translational research is aimed at enhancing adoption of best practices in the community, it cannot be conducted as an independent line of inquiry as it can be in the bench-to-bedside context. Rather, patient-oriented research should begin with the goals of clinical feasibility and community dissemination in mind. Recognizing the need to conduct such research, the Patient-Centered Outcomes Research Institute, a new federal grant-making agency, prioritizes funding of research that involves multiple key stakeholders (researchers, patients and clinicians) and uses outcomes that are meaningful to the patient. This type of translational patient-oriented research could be used, for example, to examine rehabilitation strategies that take into account the clinician’s time constraints and the willingness of the patient to adhere to therapy.

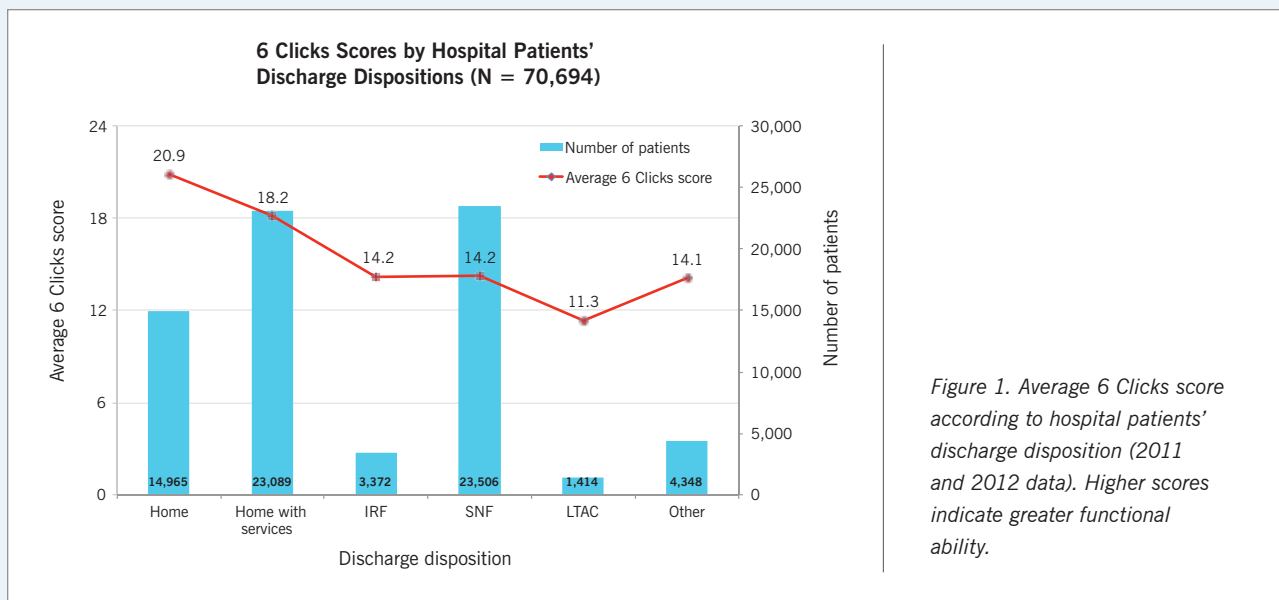
Unfortunately, although patient-oriented research identifies effective strategies to improve human health and function, too often these strategies are not feasible to implement within healthcare and/or public health services. In these cases, the strategy is then modified for implementation, which makes its effectiveness uncertain. For this reason, patient-oriented research should be more than just a collaborative effort among key stakeholders; it should also be designed with the goal of clinical feasibility and/or community dissemination at the forefront.

6 Clicks as a Case in Point

6 Clicks is an example of such a research project. In 2011, implementation of a novel rehabilitation information technology system throughout the Cleveland Clinic health system provided a platform for easy collection of discrete functional patient data. Although case mix index has long provided a measure of disease severity, measuring physical function for patients in the acute care hospital has traditionally been a low priority. This is in contrast to other rehabilitation settings, where reimbursement is tied to patient participation.

The 6 Clicks tool was developed to provide a practical means of documenting a baseline functional “footprint” for all patients seen by therapists and rehabilitation physicians in more than a dozen Cleveland Clinic hospitals and skilled nursing facilities. Three priorities directed the development of this tool:

- The time required to administer the tool needed to be measured in seconds, not minutes.
- The tool needed to be integrated with a patient-reported outcomes system while also allowing for proxy respondents.
- The tool had to share a pedigree with an outcomes system that was agnostic to environment and relevant in multiple care settings.



Creation of the tool was led by busy clinicians, with an eye toward leveraging the data for research and management purposes. It started with the goal of efficiently determining how much rehabilitation therapy should be delivered in the acute hospital setting, and to which patients. The broader aim was to use discrete patient data to help distribute rehabilitation resources rationally and ensure that patients' discharge locations are optimally suited to their rehabilitation needs (Figure 1).

The two 6 Clicks questionnaires — which measure patients' basic mobility and patients' ability to perform daily activities, respectively — were adapted from the Activity Measure for Post-Acute Care™ (AM-PAC™) computer-adapted test developed by researchers at Boston University. 6 Clicks was adapted with the time constraints of acute care clinical rehabilitation services in mind, and questions were selected based on mobility and daily activities that are meaningful to patients' function in the acute care setting. In addition, the items were chosen with a case management function in mind, using those most germane to transitioning patients to rehabilitation facilities.

The availability of a functional footprint for hospital patients allowed managers to align provision of acute hospital therapy services with patient needs. As reported in last year's issue of this publication (see page 4 at clevelandclinic.org/frontiers2012), integration of 6 Clicks into the electronic medical record (Figure 2) has enabled our clinicians to consult more intelligently and engage therapists

— particularly occupational therapists — to spend more time treating patients who need them and less time evaluating patients who won't need them.

A Research Strategy to Ensure Relevance

To further improve the validity and utility of 6 Clicks and possibly disseminate it beyond Cleveland Clinic, we are now collaborating on a research project with Boston University and the University of Vermont. Analyses of data proposed by the University of Vermont's Dr. Diane Jette will use a mix of quantitative and qualitative methodologies to examine the utility of 6 Clicks. Specifically, the five quantitative research objectives are to determine whether 6 Clicks:

- Differentiates patients who are expected to have different levels of function (e.g., we expect to see differences in functional status with 6 Click scores between young and older adults)
- Correlates with other "gold standard" measures of physical function used in rehabilitation settings, which typically take much more time to administer
- Is accurate in predicting discharge location (e.g., home vs. another setting)
- Is responsive to change in patients' expected functional status across the course of a hospital stay
- Produces consistent scores when two therapists independently complete it on the same patient

To ensure that key stakeholders are involved in the refinement of 6 Clicks, we are employing qualitative research methodology to examine clinicians' perspectives and attitudes on its practicality and effectiveness in their daily practice.

Ultimately, the goal of 6 Clicks is to provide a quick and relevant means of measuring physical function in the acute hospital. Measurement of patient function, especially patient-reported function, is at the heart of every strategy to improve the rehabilitation treatments we provide. ■

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KEY POINTS

Patient-oriented research should begin with the goals of clinical feasibility and community dissemination in mind.

Cleveland Clinic has implemented its electronically administered short-form functional outcome tool, 6 Clicks, to help distribute inpatient rehabilitation resources rationally and ensure appropriate patient discharge disposition.

We are collaborating on a research project with Boston University and the University of Vermont to further define the utility of 6 Clicks and refine its use in research and clinical practice.

PLAN

Treatment Frequency, Duration and Interventions: Physical Therapy is recommended for 5 visits per week to address weakness in bilateral lower extremities and facilitate functional mobility. Physical Therapy treatment is to include: Gait Training, Therapeutic Activity, Therapeutic Exercise. Neuromuscular Re-education.

Development of Plan of Care: Patient and family participated in plan of care development today.

Therapist pager#/Extension: 55555

AM-PAC Functional Outcomes:

Turning over in bed: 3
Lying on his/her back to sitting: 3
Bed to a chair: 3
Sitting down and standing up: 2
Walk: 2
Climbing steps: 1
Total Score: 14
Mobility Scale Score: 38.10

SESSION START: 6/18/2013 10:30:00 AM

SESSION STOP: 6/18/2013 11:20:00 AM

SESSION DURATION: 50

CHARGES:

97001 - EVAL PHYSCL THERAPY GP

0.00 Minutes : 1 Units

97110 - THERA EXER 15MIN GP

20.00 Minutes : 1 Units

Total timed code treatment minutes: 20.00 Minutes

Signed by: Sandra Passek, PT, DPT 06/18/2013 11:25:06

Figure 2. What rehabilitation physicians see when viewing a patient's 6 Clicks physical therapy summary in the electronic medical record.



For 6 Clicks Researcher, Post-Injury Rehab Transforms a Professional Calling

When Heather Scoffone set off on her bicycle on March 21, 2011, for a Half Ironman training ride, she had no idea she was also embarking on a path to choosing PM&R as her medical specialty.

Scoffone, who was then a student at Cleveland Clinic Lerner College of Medicine of Case Western Reserve University, fell off the bike while negotiating a downhill curve at 40 mph. Four weeks later, when she awoke in an acute rehab center and was finally reoriented to her surroundings, she learned she had a daunting litany of diagnoses:

- Traumatic brain injury/diffuse axonal injury
- Aspiration pneumonia
- A left-sided complex clavicle fracture
- Left-sided hemiparesis
- Post-traumatic amnesia

Remarkable Recovery — and a Professional Awakening

Despite uncertain prospects for survival during her first post-accident weeks (she believes having worn a bike helmet saved her life), Scoffone persevered through months of inpatient and outpatient rehabilitation to return to functional levels very near her pre-accident baseline.

“Every physician who’s cared for me since my memory returned told me my recovery is remarkable,” says Scoffone, who now swims, rides a stationary bike and does power vinyasa yoga. “I’m slowly getting back into running,” she adds, explaining that the intrinsic muscles of her left foot remain a bit weak.

Earlier this year Scoffone graduated from Cleveland Clinic Lerner College of Medicine, and she began a residency in PM&R at Northwestern University, one of the world’s premier PM&R training programs.

The choice of PM&R was more than coincidence. Though Scoffone was leaning toward emergency medicine or anesthesiology before the accident, her experience in rehab piqued her interest in PM&R. “I had a lot of conversations with my inpatient physiatrist about what the specialty was like,” she says. A biomechanical engineering major as an undergrad, Scoffone says she was excited by the prospect of being able to use that training in the clinical setting.

“I remember standing in physical therapy and telling my therapist, ‘I think I’m circumducting my leg,’ and I realized I hadn’t used that term since my undergrad days,” Scoffone says.

Sealing the Deal

Before Scoffone returned to medical school at Cleveland Clinic in January 2012 (her accident occurred when she was in Maryland as a student researcher in an NIH research training program), her adviser put her in touch with Department of Physical Medicine and Rehabilitation Chairman Frederick Frost, MD, after which Scoffone decided to do an extra semester of PM&R-specific research.

In addition to gaining clinical experience and training, Scoffone developed a 6 Clicks research project (see preceding article), working to assess the 6 Clicks tool's subject-proxy consistency. After therapists completed the 6 Clicks questionnaire for patients, Scoffone asked the patients to answer the questions themselves, and then she compared responses.

While Scoffone's accident and recovery prompted her Cleveland Clinic mentors to urge her to look into PM&R practice and research, "it never changed their view of me as a researcher," she says. "I never felt they thought any less or differently of my abilities because of my injury. That was really important."

This exposure to PM&R, along with some PM&R electives at other locations, sold her on the specialty. As she begins her residency at Northwestern, Scoffone plans to specialize in brain injury. "It's the cliché answer following my experience, but it's truly my top interest."

Lessons from the Stethoscope's Other Side

Scoffone feels her singular experience as a patient has made her a better PM&R physician — and a better overall caregiver. "It's taught me how vital it is for physicians to not destroy the sliver of hope for recovery a grieving family might hold, despite what the medical data may predict," she says. "At the same time, we must not give false hope. We need to walk a fine line, but it's possible to walk it elegantly. I know how important it is to always try to do so."

While Scoffone has shared her experience with a few of her PM&R patients in real need of hope and inspiration, she does so sparingly. "I can't let it be a distraction from their care," she says. "But it can sometimes be helpful to



Opposite page: Heather Scoffone, MD, receives her diploma from Cleveland Clinic Lerner College of Medicine in May, with her academic adviser, Jennifer Kriegler, MD, behind her. **Above:** Scoffone with another of her mentors, Department of Physical Medicine and Rehabilitation Chairman Frederick Frost, MD.

say, 'When I was 26 I had a brain injury from a serious accident, and it wasn't the end of the world for me — look, I'm standing before you today.' Conveying that sense of possibility can be very important."

The accident also showed her what it's like to be "on the other side of the stethoscope," as she puts it. "I'm now highly conscious of draping patients with a towel or blanket when I'm examining them, to cover parts I don't need to see. And I know what it's like to have to push a button to ask to go to the bathroom. Many of our patients feel they're no longer in control of their lives at all. Now I really have insight into that." ■

Multiple Sclerosis Performance Testing: Novel App Seeks to Enhance Functional Assessment and Empower Patients

By Francois Bethoux, MD

Assessments of neurologic function in patients with multiple sclerosis (MS) have traditionally been performed during office visits. However, in a chronic disease such as MS, characterized by an unpredictable course with exacerbations and progression over time, more precise and more frequent assessments are needed to guide increasingly complex treatment decisions.

Cleveland Clinic's Mellen Center for Multiple Sclerosis Treatment and Research, under the leadership of Richard Rudick, MD, together with the team of Jay Alberts, PhD, in the Department of Biomedical Engineering, is addressing this challenge with a set of performance tests developed for the iPad® — the Cleveland Clinic Multiple Sclerosis Performance Test (MSPT) app. The goal is to facilitate assessments in a variety of settings, including the patient's home. In addition to providing enhanced information to clinicians and researchers, the MSPT app will eventually help empower patients with MS to participate more fully in their own care.

Patient Assessment: The Need for a Better Way

The need for novel assessment tools in the management of MS is driven by several factors:

- The best-practice model of care for MS is comprehensive management, which involves assessing and monitoring multiple consequences of the disease.
- Treatment options for the disease process and for resulting symptoms and disability are rapidly growing, which leads to increasingly complex decision-making and the need to closely measure treatment outcomes.
- The disease course is unpredictable, requiring management and monitoring to be individualized.
- Healthcare reimbursement is increasingly driven by performance, which requires the ability to routinely generate outcomes data.

The duration and frequency of clinic or office visits currently limits our ability to perform thorough and repeated assessments of functional performance. Furthermore, patients

with neurologic disabilities may find it difficult to travel to a medical clinic or may live far from an MS specialist. At the same time, technological advances and progress in measurement science offer opportunities to precisely quantify performance while minimizing the time, personnel and equipment needed.

An App Is Born

These factors prompted development of the MSPT app to enable easy and objective quantification of patients' neurologic function on an iPad. Using the sensors embedded in the tablet, the MSPT app allows assessment of the following functions across the spectrum of MS disability:

- Walking speed
- Balance
- Upper extremity function
- Processing speed (a cognitive test)
- Low-contrast visual acuity

Validation Underway

Cross-sectional validation of the MSPT is underway among a target sample of 50 patients with MS and 50 healthy controls. To date, data are available for 27 MS patients and 23 healthy controls who completed the testing session. A preliminary analysis showed excellent test-retest reproducibility as well as agreement between MSPT components and corresponding clinician-administered tests. Statistically significant differences were observed between patients and controls on walking speed, upper extremity function and processing speed. More than 90 percent of participants reported that the MSPT was easy to complete, and none reported fatigue from testing.

Future Developments

The MSPT app will provide a validated battery of performance tests that are easy to administer and will generate quantitative results that are readily available for clinical and



research purposes. Computerized administration will allow innovative approaches to analysis. Since the data can be transmitted via secured link, the MSPT can be administered in various settings, including nonacademic clinical practices — and eventually patients' homes.

Routine at-home assessments — performed as part of a distance-health intervention — hold promise as a cost-effective method for acquiring more accurate and reliable data in a real-life environment. Such an approach to patient assessment has the added benefit of empowering patients to take a more active role in monitoring and managing their disease.

The long-term management of MS and its many consequences relies on patients performing exercises, improving their general health, modifying their activities, using devices and taking medications. In turn, the efficacy of these treatment strategies depends on the ability to monitor outcomes and provide direct and frequent feedback to patients and their healthcare providers. Such feedback may also motivate patients and improve their adherence to treatment.

The MSPT app represents a novel approach to assessing functional performance in MS that uses a technology available to the general public. It promises to enhance our understanding of the evolution of MS-related disability and contributing factors, provide more in-depth knowledge of the outcomes of various treatments, and help empower

patients and their loved ones in their daily fight against the devastating consequences of MS. ■

Dr. Bethoux is a physiatrist in Cleveland Clinic's Mellen Center for Multiple Sclerosis Treatment and Research specializing in neurorehabilitation and spasticity management. He can be reached at 216.444.9025 or bethouf@ccf.org.

The validation study of the MSPT was funded by Novartis Pharmaceuticals Corp.

KEY POINTS

The functional assessments routinely performed on patients with MS during office visits are limited in scope and costly to obtain.

The Cleveland Clinic MS Performance Test (MSPT) app was developed to allow frequent, cost-effective and user-friendly capture of objective measures of neurologic performance across providers and settings — and eventually by patients at home.

The MSPT is currently being validated and will be available as an app for the iPad. It is representative of a new generation of tools to enhance MS care and research.

Dedicated Cancer Rehabilitation: Improving Quality of Life Throughout the Course of Cancer Care

By Sree Battu, MD

The Department of Physical Medicine and Rehabilitation's cancer-related services have advanced significantly in the past year, thanks to an active partnership with Cleveland Clinic's Taussig Cancer Institute and other Cleveland Clinic institutes and programs (see sidebar below). This collaboration is facilitated by Cleveland Clinic's distinctive organizational model, designed around disease-based institutes to enhance cooperation across specialties and disciplines.

Though physiatrists play an integral role in this program, access to a broad network of talented cancer rehabilitation physical and occupational therapists is not restricted. In fact, direct referrals to the therapists by surgeons and oncologists is encouraged. As a result, hundreds of patients benefit from contact with specialized rehabilitation providers, and physiatric consultations become more meaningful as the therapy team identifies and routes many patients with compelling diagnostic and management needs.

Why Cancer Makes for Unique Rehab Patients

At the heart of the program, which currently focuses on breast cancer patients and survivors, is a recognition that

patients with cancer often have physical, psychological and social needs that go beyond their cancer diagnosis and cancer-specific treatments. Cancer patients are unique rehabilitation patients because their impairments are remarkably complex and their personal goals are very different at each stage of their disease process. Our Cancer Rehabilitation Program offers a range of services and resources focused on these multidimensional needs at all stages of the cancer continuum: diagnosis, treatment, post-treatment and long-term follow-up, survivorship, and end-of-life care.

Early and Enduring Role for Rehab

Cancer rehabilitation encompasses a range of therapies, educational interventions and support services that can be offered to the patient at any point in the care continuum. Our goal is to integrate rehabilitation early in the care process and ensure that it is considered by oncology specialists in patients' overall treatment plans. This early integration can be key to averting or ameliorating the significant physical loss of function that cancer surgery and treatments can cause.



Cancer Rehabilitation Program at a Glance

- A collaboration among the Department of Physical Medicine and Rehabilitation, the Taussig Cancer Institute, the Ob/Gyn & Women's Health Institute, the Breast Center within the Digestive Disease Institute, and Cleveland Clinic Rehabilitation and Sports Therapy
- Objective is to develop patient-oriented functional goals throughout the cancer care continuum and provide tailored services during treatment, after treatment and at the end of life
- Currently focused on breast cancer patients and cancer survivorship, but scope will be expanded to patients with other cancer types
- Available at more than nine locations throughout Northeast Ohio

Well-designed research studies in breast cancer patients are limited, but they have shown that effective rehabilitation services can improve the following:

- Upper and lower body strength
- Flexibility
- Body image
- Bone density
- Symptoms of fatigue, dyspnea, pain, anxiety and depression

Collaboration Is Crucial

Our Cancer Rehabilitation Program works in conjunction with the patient's cancer team to provide an extra layer of support and comprehensive care. We've found formal educational programming on the importance of rehabilitation at each stage of cancer management to be invaluable in securing the cooperation and support of our oncology specialist colleagues (surgeons, oncologists, hematologists, radiation oncologists and hospice/palliative care providers) and the oncology support staff.

Likewise, formal educational programming on common medical issues and impairments among breast cancer patients has been critical to enabling our rehabilitation clinicians (occupational and physical therapists) to design therapy programs that are patient-centered and appropriate to the patient's stage in the care continuum.

Importance of Tailoring and Regular Evaluations

Effective rehabilitation in this setting recognizes that cancer can profoundly change a patient's sense of personhood. Our program assesses the whole patient in designing an individualized, patient-centered rehabilitation plan to help achieve the highest level of function possible within the limits of the patient's disease and in keeping with her/his personal goals. We strive to enhance quality of life for patients living with cancer and the effects of cancer treatments.

Since breast cancer patients are treated by occupational and physical therapists, these disciplines have collaborated from the start to develop programming using evidence-based guidelines and best-practice models. One key to our program design is having consistent functional evaluations for every patient before surgery, after surgery and at appropriate intervals. This is a collaborative effort. Surgical nurses perform preoperative functional measurements that can be referenced postoperatively by surgeons or rehab professionals. When patients start rehabilitation after surgery, they undergo more detailed evaluations that include functional measurements and questionnaires assessing quality of life. These evaluations are continued periodically to track changes in each patient's progress.



Ongoing Program Refinements

Our program is developing a prospective surveillance model to evaluate how physical impairment develops in patients with breast cancer and how best to treat and allocate resources to reduce disability and suffering.

We've also developed a unique algorithm to help patients find the most appropriate therapist for their needs at a location near home. There is strong interest in treating breast cancer patients among rehabilitation clinicians across the Cleveland Clinic Rehabilitation and Sports Therapy network, yet some clinicians have more experience than others. Our algorithm accounts for the patient's needs and the experience and comfort of the clinician when matching patients with therapists. Patients with more complex medical issues that require a neuromuscular workup or symptom control with medication management will see a rehabilitation physician with specialty training in cancer rehabilitation. ■

Dr. Battu specializes in cancer rehabilitation, general rehabilitation, palliative care and hospice medicine in the Department of Physical Medicine and Rehabilitation. She can be reached at 216.445.0915 or battus@ccf.org.

KEY POINTS

Cancer patients are unique rehabilitation patients because their impairments are highly individual and their goals can differ considerably at each stage of the disease process.

Our program aims to integrate rehabilitation early in cancer patients' care continuum and ensure that it is considered in the overall treatment plan.

We are developing a prospective surveillance model to reduce disability for breast cancer patients and improve quality of life using best-practice guidelines to contribute to rehabilitation science.

Acupressure/Acupuncture in Pediatrics: Noninvasive Techniques Offer Options to Enhance Rehabilitative Care

By Benjamin Katholi, MD

Cleveland Clinic has added acupuncture — often without needle insertion — to its armamentarium for PM&R care in children.

Since mid-2012, I have been offering acupuncture and the related technique of acupressure (see below) as options to treat a variety of symptoms that can interfere with rehabilitation in my PM&R practice at Cleveland Clinic Children's. The tailored application of these techniques as complementary therapy can help select pediatric patients achieve their rehabilitative goals.

Needles Often Not Required

After many years of use in Chinese medicine, acupuncture has gained a foothold in the United States for use in adults to treat headache, postoperative and chemotherapy-induced vomiting, addiction, and musculoskeletal pain, among other indications. Acupuncture's use in pediatrics has lagged because children tend to be more fearful of needles, but needle stimulation is just one of the techniques that can be offered.

Techniques that avoid puncturing the skin are generally painless while producing many of the same effects as traditional needle-based acupuncture. These techniques include:

- **Acupressure**, which involves application of gentle to firm physical pressure at the same pressure points and meridians used in acupuncture

- **Laser acupuncture**, a method used to stimulate acupuncture points
- **Microcurrent stimulation**, which uses pads attached to a stimulation device (see photo, opposite page) that generates continuous electric impulses; the frequency and intensity of pulses can be varied based on therapy goals

Mechanisms Uncertain

The mechanisms by which acupressure/acupuncture controls symptoms are not fully understood. The pain control effects may reflect release of neurochemicals such as beta-endorphins and enkephalins. Other theories include regulation of the autonomic nervous system, alterations in sympathetic and parasympathetic nervous system activity, increases in local blood flow, and nitric oxide production changes in neurotransmitter activity in the brain. Research on mechanisms continues to be pursued internationally.

Adjunctive Role for Many Indications

Acupressure/acupuncture is not meant as a replacement for traditional medical or rehabilitative treatments but as a supplement with a low risk of side effects. For instance, despite advances in anti-emetic medications, children still suffer from postoperative and chemotherapy-induced nausea and vomiting, and control of medication-resistant nausea and vomiting is one of acupressure/acupuncture's



An acupressure magnet for use in supplementing acupressure treatment



A device used for point location as well as for delivering microcurrent stimulation

recognized indications in children. Additionally, in the setting of postoperative pain, acupressure/acupuncture may reduce the need for opioid medications.

Other pediatric indications include treatment of constipation, headache, fatigue, musculoskeletal pain, drooling, anxiety and sleep disorders. The ability to treat multiple symptoms in a single session is a major advantage. In my experience, acupressure/acupuncture can be especially helpful in treating children and teens with complex problems such as brain injury and chronic pain.

Nuts and Bolts of Clinical Use

Practitioners of pediatric acupressure/acupuncture offer these techniques to patients from birth through the teen years. Young children tend to be more sensitive to acupressure techniques than are adolescents and adults; in teens, needle insertion may be required to achieve the desired effect. Four to six treatment sessions may be needed to accurately gauge a technique's success. The effect of acupressure/acupuncture tends to be additive, similar to consistent use of a medication.

The incidence of adverse effects may be lower with acupressure/acupuncture than with medications used to treat the same symptoms. Needle insertion is avoided in patients with a high risk of infection (e.g., compromised immune function) or a risk of bleeding, as well as in younger patients who fear needles or may not tolerate long needle retention times. Contraindications to noninvasive techniques are rare.

Collaboration with Fellow Caregivers — Including Patients

At Cleveland Clinic Children's, acupressure/acupuncture is provided in a context of close multidisciplinary collaboration. I begin by discussing the potential utility of acupressure/acupuncture in alleviating symptoms and promoting rehabilitative goals with the patient's other pediatric physicians and therapists. Following a traditional comprehensive assessment of symptoms, patients and/or their families undergo an assessment specific to acupressure/

acupuncture. It is essential to establish a trusting relationship with the child before treatments are administered.

Opportunities for collaboration extend to the point that acupressure/acupuncture can sometimes be incorporated into a child's regular therapy sessions. For instance, if a physical therapist is working to loosen tight muscles, I might assist with acupressure/acupuncture during the same session.

Following acupressure treatment, the technique and appropriate pressure points can be taught to parents and patients so they can deliver treatment at home. In these cases the patient is reassessed periodically, at which time additional or different pressure points may be incorporated. Flexibility in applying the treatment as a child's body develops is an advantage of acupressure. An additional advantage is the empowerment patients and parents often derive from directly participating in their rehabilitative care through acupressure treatment at home. ■

Dr. Katholi is a physiatrist in Cleveland Clinic Children's Department of Developmental and Rehabilitation Pediatrics. His specialty interests include acupressure/acupuncture. He can be reached at 216.448.6254 or katholb@ccf.org.

KEY POINTS

Tailored application of acupressure/acupuncture can help select pediatric patients achieve their rehabilitative goals.

Noninvasive techniques, including acupressure, laser acupuncture and microcurrent stimulation, produce many of the same effects as acupuncture that uses needle insertion.

At Cleveland Clinic Children's, we can consider incorporating acupressure/acupuncture into a child's therapy sessions when indicated and teach patients to self-administer acupressure at home.

Distance Learning for Self-Management in Disabling Conditions: Advancing Options to Keep Patients Doing What They Love

By Matthew Plow, PhD

The most important outcome in patient-centered rehabilitation is full participation in life roles — an academic term referring to involvement in all the activities and situations that a person desires. Unfortunately, individuals with disabling neurological conditions receive limited support to maintain full participation in life roles once they are discharged from outpatient rehabilitation services. Cleveland Clinic is combating this challenge with multiple studies aimed at evaluating new distance learning interventions to help keep patients pursuing their passions.

The Imperative for Self-Management Skills

Adults with disabling neurological conditions often face a host of challenges to participating in vital life roles such as parenting, maintaining employment, and engaging in beloved hobbies and leisure activities. Impairments and functional declines in their ability to interact with environmental factors reduce autonomy and the ability to participate in these roles. Affected individuals are often forced to focus on only the necessary chores and tasks of daily living, which can sap their sense of purpose and fulfillment.

Our NIH-funded study moves beyond the one-size-fits-all approach of most self-management interventions, with content tailored to patients' symptom profiles.

Fortunately, learning self-management tasks and skills can help patients with disabling neurological conditions achieve a balance between chores and leisure activities. Such learning also can facilitate participation in social roles and reduce the overall impact of impairments and symptoms on daily activities. Self-management programs teach patients necessary skills in problem-solving, communication, decision-making, emotional management and resource utilization. Research demonstrates that self-management programs can improve overall quality of life, help people maintain independence in the community and reduce healthcare costs.

A Role for Distance Learning

Nonetheless, self-management programs are not widely available in the community, and when they are, they are often inaccessible to those who need them most. Furthermore, clinicians often have limited time with patients to teach self-management skills during in-person visits.

Fortunately, advances in remote monitoring, videoconferencing and e-mobile technology now make it possible for healthcare organizations to implement cost-effective distance learning interventions to help patients with self-management of their conditions. Distance learning interventions can:

- Help minimize the costs of implementing self-management
- Increase dissemination and accessibility
- Facilitate more patient-centered, personalized medicine (e.g., tailoring interventions and taking conversations beyond medication management)
- Facilitate continuity of care (e.g., interacting with patients outside an in-person appointment)

Specifically, we believe the post-acute rehabilitation setting presents an ideal opportunity to start the conversation with patients about routine engagement in exercise and self-management of symptoms. Once patients are discharged from rehabilitation services, distance learning

interventions can be implemented to support them in self-management. Such interventions (e.g., mailing printed materials, telehealth strategies, e-mobile health technology) can be tailored to the needs of each patient and focus on the symptoms and impairments that are interfering with participation in life roles. Thus, our recent research focuses on the development and evaluation of novel distance learning interventions that are feasible to implement and tailored to patients' characteristics (i.e., stage of change, symptoms and psychological profile).

A Trio of Studies in MS and Beyond

Our recently completed NIH-funded study (in press) indicates that simple, cost-efficient strategies — such as mailing printed material psychologically tailored to patients' characteristics and symptom profiles — can effectively promote adherence to self-management behaviors in patients with multiple sclerosis (MS) and reduce symptom severity.

Similarly, we are currently conducting research funded by the National Multiple Sclerosis Society on the effectiveness of a teleconference program to promote physical activity and self-management of fatigue in patients with MS (for more, see page 16 at clevelandclinic.org/frontiers2012).

We are conducting a separate NIH-funded study on the usability and effectiveness of e-mobile health technology to promote self-management behaviors in adults with stroke, Parkinson disease or MS. We are comparing the effectiveness of two types of distance learning: a computer tablet-based intervention vs. a paper-and-pencil-based intervention. The goals of each are to facilitate learning of self-management skills, increase adherence to healthy behaviors, reduce symptom impact and, ultimately, improve participation in life roles.

Participants will be randomized to receive either the Google® Nexus™ 7 tablet or pamphlets and logs to learn about self-management skills and how to manage symptoms, set realistic goals, monitor progress and receive feedback (via email or printed material) on their progress from a health education specialist. Both of these distance learning interventions move beyond the one-size-fits-all approach of most traditional self-management interventions, as patients will receive tailored content based on their symptom profiles. We hope to have study results by the end of 2013. ■

To learn more about our research or to refer a patient with MS, Parkinson disease or stroke, contact the study office at 216.445.1203.

Dr. Plow is a project scientist in the Department of Biomedical Engineering and the Department of Physical Medicine and Rehabilitation. His research interests include promoting initiation and maintenance of physical activity for persons with chronic disabling conditions, developing and testing outcome measures, and promoting self-management of symptoms. He can be reached at 216.445.3288 or plowm@ccf.org.

KEY POINTS

The most important outcome in patient-centered rehabilitation is full participation in life roles, which is challenged in multiple ways for most patients with disabling neurological conditions.

Advances in technology enable use of cost-effective distance learning interventions to teach patients self-management of their conditions, particularly in the post-acute rehab setting.

We are conducting an NIH-funded study to compare two types of distance learning (one via computer tablet, one with printed materials) for delivering tailored self-management instruction to adults with stroke, Parkinson disease or multiple sclerosis.

High Interest in Debut Musculoskeletal Ultrasound Workshop Promises Expanded Offerings Ahead

When Michael P. Schaefer, MD, talks with colleagues about musculoskeletal ultrasound, one aspect that frequently comes up is its ability to perform dynamic assessment.

“Almost all other imaging modalities show only a static picture, but with musculoskeletal ultrasound, we can see the structure of interest in motion,” he says. “And if there’s a catch or a pop or a click, we can often correlate that with whatever structure is abnormal. That’s something that stands out for a lot of practitioners.”

Besides these dynamic capabilities, Dr. Schaefer thinks ultrasound’s affordability and portability are important reasons for the high level of interest in the inaugural offering of Cleveland Clinic’s Musculoskeletal Ultrasound Workshop in May, for which he served as course director.

The half-day CME-certified course — which featured a generous offering of live scanning and hands-on lab sessions — reached maximum registration a couple of months in advance, drawing more than 70 attendees from across Ohio and from states as far away as Georgia. The interest has led to plans to offer the workshop on an annual basis and to expand its length and curriculum.



A Hunger for Training

“We were hoping to fill a void in musculoskeletal ultrasound education in the Northeast Ohio region,” explains Dr. Schaefer, who is Director of Musculoskeletal Rehabilitation with a joint appointment in the Neurological Institute’s Department of Physical Medicine and Rehabilitation and the Orthopaedic & Rheumatologic Institute.

“There’s a well-established need for education in musculoskeletal ultrasound,” he says. “Many people were asking for one-on-one mentoring or other learning opportunities, so we decided to bring together our own top experts in ultrasound as it relates to the musculoskeletal system and educate a lot of providers in a single setting.”

Multidisciplinary Faculty and Attendees

Those experts came from a broad range of specialties at Cleveland Clinic — PM&R, rheumatology, orthopaedics, sports health and neurology — and from locations as far afield as Cleveland Clinic Florida. The workshop’s highly multidisciplinary faculty is one of the factors that distinguishes it among the handful of musculoskeletal ultrasound courses offered by other institutions, says Dr. Schaefer. “For instance, we had a neurologist, Steven Shook, MD, demonstrating ultrasound of the peripheral nerve, one of the more challenging applications, so that was an important and distinctive contribution.”

Attendees were similarly varied, with significant numbers of physiatrists, orthopaedists and rheumatologists, among others. An informal poll of the audience found that two-thirds were not yet using ultrasound in their practice, and most of the remaining third had been using it for less than two years. “Probably more than half of practices that treat musculoskeletal conditions have an interest in developing ultrasound,” Dr. Schaefer says.

From the Big Picture to Hands-On Learning

The workshop covered the following applications of the technology:

- Using ultrasound to do bedside diagnosis — everything from detecting a rupture in a tendon to measuring the size of a nerve to elucidate possible disease processes



The workshop included hands-on scanning labs in small groups (above) and live demonstration sessions (opposite page).

- Longitudinally monitoring structures of interest throughout a course of therapy
- Assessing inflammatory changes using the Doppler feature
- Guiding needles for injections

Instruction was offered in multiple formats. Lectures provided critical reviews of the newest techniques and devices. Demonstration sessions revealed sonographic findings in common pathologies. Sessions at lab stations, offered in intimate groups of four or five attendees, presented hands-on opportunities to do everything from scanning multiple joints on live models to attempting a saline injection within a deep joint capsule to optimizing machine settings for diagnostic and interventional techniques.

Expanded Course Expected for 2014

Dr. Schaefer expects the next offering of the Cleveland Clinic workshop, likely to be held in spring 2014, will last at least a day and a half, and he hopes to include cadaver lab sessions. He sees no sign that demand for this instruction will plateau soon. "I'd estimate that only 1 in 5 community-based practices are using musculoskeletal ultrasound when they could be," he notes.

For information on the next offering of the workshop, email cmeregistration@ccf.org or visit ccfcme.org/ultrasound14. ■

Cleveland Clinic Launches Musculoskeletal Medicine Fellowship

The ultrasound workshop isn't Cleveland Clinic's only new educational offering in musculoskeletal medicine. A new one-year Musculoskeletal Medicine Fellowship was launched in July 2013 through Cleveland Clinic's Orthopaedic & Rheumatologic Institute, with PM&R as the primary specialty in which candidates are recruited.

"There's been a move within PM&R toward more musculoskeletal care, and this fellowship reflects that," says Michael P. Schaefer, MD, the fellowship's director. He explains that PM&R physicians have recently been allowed to sit for the subspecialty boards for sports medicine and pain management, "but most of us practice more general musculoskeletal care, not just sports or pain management. I've designed this fellowship to be practical for a physiatrist in real-world practice or a primary care specialist who wants to do more musculoskeletal care."

An important part of that, he adds, is the "regular and systematic exposure" to musculoskeletal ultrasound that the fellowship provides, including one day a week designated for bedside ultrasound. "This is a greater exposure than in any other fellowship I know of," says Dr. Schaefer.

The program is also designed to provide the fellow with a lot of practical interaction with orthopaedic surgeons through rotations in orthopaedic clinics. "Side-by-side training with orthopaedists is necessary for the fellow to really understand the surgical options that are available, the indications for them, and what's needed for postsurgical follow-up and outcome assessment," says Dr. Schaefer. "We see the growth in musculoskeletal medicine as fostering a greater partnership between physiatrists and orthopaedic surgical colleagues, with surgeons relying more on physiatrists for initial evaluation and management of chronic musculoskeletal disease."

The fellowship currently accepts one applicant per year. Interviews for the 2014-2015 fellowship are taking place this fall; interested applicants may contact Dr. Schaefer at schaeferm5@ccf.org. ■

PM&R

Department of Physical
Medicine and Rehabilitation

AT A GLANCE

INPATIENT
REHABILITATION

SKILLED
NURSING CARE

OUTPATIENT
THERAPY

Through our three Cleveland Clinic Rehabilitation Hospitals and Cleveland Clinic Children's Hospital for Rehabilitation, we offer acute inpatient rehab care across **120 BEDS** for patients of any age.



DEPARTMENT OF PM&R BY THE NUMBERS

40

STAFF PHYSICIANS AND
COLLABORATIVE CLINICAL STAFF

164

FTE STAFF

7

RESEARCH STAFF
(physicians and
PhD researchers)

750+

SPECIALTY-TRAINED PTs, OTs AND
SPEECH THERAPISTS in **Cleveland
Clinic Rehabilitation and Sports
Therapy**, run in conjunction with the
Orthopaedic & Rheumatologic Institute

2012

BY THE
NUMBERS

1,902 acute inpatient rehab admissions

4,057 total inpatient days

379,597 outpatient visits

340,712 inpatient visits

720,309 total patient visits

RESEARCH FUNDING BY THE NUMBERS

12 active research projects
with grant/private funding

\$5.2m in federal government
funding (NIH/DOD)

\$800k in foundation support

\$150k in private funding support

OUTCOMES SNAPSHOTS in Acute-Care Hospital Patients (2012)

93%

Proportion of patients with stable or improved ability
to perform PT functional tasks on 6 Clicks AM-PAC
Short Form tool

7.4% → 29%

Change from admission to discharge in proportion
of patients requiring minimal or no assistance in PT
functional tasks on 6 Clicks AM-PAC Short Form tool

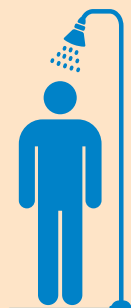


95%

Proportion of patients with stable or improved ability
to perform OT functional tasks on 6 Clicks AM-PAC
Short Form tool

3.7% → 19%

Change from admission to discharge in proportion
of patients requiring minimal or no assistance in OT
functional tasks on 6 Clicks AM-PAC Short Form tool



Department of Physical Medicine and Rehabilitation Staff

Adult Physical Medicine and Rehabilitation Staff



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Chairman, Department of Physical Medicine and Rehabilitation

Executive Director, Cleveland Clinic Rehabilitation and Sports Therapy

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Specialty interests: Neurorehabilitation, PM&R, rehabilitation services



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Specialty interests: Spinal cord injury, cardiac rehabilitation, spasticity management



Keerthi Atluri, MD

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Specialty interests: Acute low/mechanical back pain, amyotrophic lateral sclerosis, arthritis, back pain in athletes, gait dysfunction, herniated disk



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Director of Rehabilitation Research

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Ela Plow, PhD

Specialty interests: Stroke, spinal cord injury, neurorehabilitation, motor control, functional MRI, diffusion tensor imaging, brain stimulation, neurophysiology



Matthew Plow, PhD

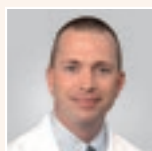
Specialty interests: Self-management, physical activity and wellness promotion in adults with disabling conditions

Cleveland Clinic Florida



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Evan Peck, MD

Specialty interests: PM&R, PM&R – sports medicine

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Specialty interests: Interventional spine procedures, spine health, sports medicine, EMG

Multiple Sclerosis – Physiatrists



Francois Bethoux, MD

Specialty interests: Neurorehabilitation, spasticity management



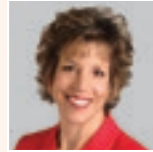
Santhosh Thomas, DO, MBA

Specialty interests: EMG, evaluation and management of back and neck pain, interventional pain management, sports medicine



Keith McKee, MD

Specialty interests: Neurorehabilitation, spasticity management



Deborah Venesy, MD

Specialty interests: EMG, evaluation and management of back and neck pain, management of occupational conditions and illnesses, neck and back disorders, rehabilitation of neuromuscular disorders

Pain Management – Physiatrists



Daniel Leizman, MD

Specialty interests: PM&R, spine care, musculoskeletal injuries, degenerative joint disease, sports medicine, wellness, EMG and nerve conduction studies, interventional pain management



Adrian Zachary, DO, MPH

Specialty interests: Spinal diagnostics, interventional pain management, spine wellness



Hong Shen, MD

Specialty interests: Acupuncture, back/neck pain evaluation and management, interventional pain management, chronic pain, neuropathic pain, nonsurgical orthopaedics, rehabilitation, spine pain



Douglas Henry, MD

Director, Department of Developmental and Rehabilitation Pediatrics

Specialty interests: Spasticity management, Botox injections, baclofen pump management, gait abnormalities, toe walking, complex regional pain syndrome, fibromyalgia, cerebral palsy, TBI, spinal cord injury, torticollis

Spine Health – Physiatrists



Edwin Capulong, MD

Specialty interests: Interventional spine procedures, musculoskeletal ultrasound, joint injections



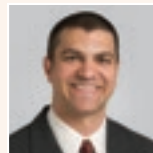
Ethan Benore, PhD

Specialty interests: Cognitive-behavioral treatment for chronic pain, behavioral treatments for headache, biofeedback in children, sleep disorders in children



Russell DeMicco, DO

Specialty interests: Evaluation and management of back pain in adults and adolescents, nonoperative spine care and musculoskeletal medicine, interventional spine procedures



Benjamin Katholi, MD

Specialty interests: Spasticity management, gait disorders, orthotics and prosthetics, neuromuscular disease, adult transition planning for adolescents with physical disabilities, medical acupuncture



Tagreed Khalaf, MD

Specialty interests: Musculoskeletal medicine, nonoperative spine care, osteoporosis, sports medicine



Virmarie Quinones-Pagan, MD

Specialty interests: Pediatric rehabilitation medicine

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About Cleveland Clinic

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In 2013, Cleveland Clinic was ranked one of America's top 4 hospitals in *U.S. News & World Report's* annual "America's Best Hospitals" survey. The survey ranks Cleveland Clinic among the nation's top 10 hospitals in 14 specialty areas, and the top in heart care for the 19th consecutive year.

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