

# A FUTURE MODEL OF MUSCULOSKELETAL REHABILITATION AT THE UNIVERSITY OF IOWA HOSPITALS AND CLINICS: SPANNING THE CONTINUUM OF CARE

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## ABSTRACT

**Models of rehabilitation care vary widely within academic medical centers, with most housing their own inpatient rehabilitation units. The University of Iowa Hospitals and Clinics focuses both on acute hospital inpatient and outpatient rehabilitation care instead of leaving rehabilitation to local community-based hospitals. This article discusses a method to provide adult inpatient rehabilitation care, and simultaneously provide specialized rehabilitation teams capable of spanning the entire continuum of rehabilitative care from admission at a Level I Trauma Center to the conclusion of successful outpatient rehabilitation needs. The costs of implementation of this plan can be justified by avoiding increased expenses already being incurred in addition to successful capture of outpatient rehabilitation revenues.**

## THE CURRENT MODEL OF INPATIENT REHABILITATION CARE AT ACADEMIC MEDICAL CENTERS

Most academic medical centers provide a comprehensive array of acute medical services ranging from specialized burn and trauma units and pediatric bone marrow transplant units, to outpatient specialty clinics and other "Centers of Excellence." Most academic medical centers also felt the need to develop an inpatient rehabilitation unit to serve their patients with neuromuscular injuries or diseases. When hospitals and academic medical centers were forced to utilize Diagnosis Related Group payments for their hospitalized patients, many inpatient rehabilitation units flourished as they continued to be paid for actual charges under a fee-for-service type of contract. However, with the recent de-

velopment of the Prospective Payment System for Rehabilitation, running a viable rehabilitation unit has posed increasingly difficult economic challenges. For those academic medical centers without an inpatient rehabilitation unit, these challenges are yet another barrier to the development of an inpatient rehabilitation unit. However, when examining the costs of an academic health center without such an inpatient rehabilitation unit, one must realize that there is a tremendous potential for cost-savings by shaping the model of rehabilitation to one that spans the continuum of care from admission to a Level I Trauma Center to successful capture of outpatient rehabilitation services.

## THE PAST MODEL OF INPATIENT REHABILITATION CARE AT UIHC

The University of Iowa Hospitals and Clinics (UIHC) has traditionally focused on providing only acute care hospital services and leaving rehabilitation care to its local community hospitals in Cedar Rapids, Waterloo, Davenport, Dubuque, and Des Moines. Patients admitted for stroke or multiple traumatic injuries had their acute neurological and orthopaedic surgical care provided by world-renowned neurologists, neurosurgeons, orthopaedic surgeons and trauma surgeons. When they reached medical stability, they were transferred to the local rehabilitation unit nearest to their home, provided that they had medical insurance or readily qualified, given their new neuromuscular injuries or disabilities.

In August 2000, the University of Iowa Hospitals and Clinics hired its first physiatrist (a physical medicine and rehabilitation physician) for the main purpose of running an outpatient musculoskeletal and spine practice for many of their non-surgical chronic spine pain patients within the Department of Orthopaedics. UIHC and the Carver College of Medicine did not have a Department or Division of Physical Medicine & Rehabilitation recognized within its College of Medicine.

In January 2005, the University of Iowa Hospitals and Clinics appointed its first Medical Director of Rehabilitation to coordinate rehabilitative services for its organization. Many positive changes had occurred for rehabilitation specialists within the past five years. The Center for Disabilities & Development, formerly the University Hospital School, has opened its eight-bed Pediatric Neuro-Trauma Rehabilitation Unit, similar to

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a model of care existing at Denver Children's Hospital. The Department of Rehabilitation Therapies, a hospital-based department, consisted of a consolidation of prior departments of physical therapy, occupational therapy and activities therapy led by an experienced physical therapy administrator. During a review by the American College of Surgeons Committee on Trauma, UIHC was criticized for its lack of physician-directed rehabilitation services during a review of their Level I Trauma Center. In response, UIHC developed a Trauma Rehabilitation Consultation Service to provide psychiatry consultation and coordination of care for its spinal-cord injured and traumatic brain-injured patients. The Department of Orthopaedics also changed its name to the Department of Orthopaedics and Rehabilitation, thus reflecting the spectrum of care provided and the fact that its two physiatrists were recognized by its College of Medicine. The Spine Rehabilitation Program became even better-recognized by physicians within The State of Iowa for its expertise in treating patients with complex chronic musculoskeletal pain by utilizing an interdisciplinary team approach with physical therapists, psychologists, medical social workers and vocational counselors. Despite these advances, there still continues to be significant room for improvement within the spectrum of rehabilitation care at UIHC in the future.

**THE CURRENT MODEL OF INPATIENT REHABILITATION CARE AT UIHC**

There are several reasons why many other academic health centers have abandoned the current model of rehabilitation utilized at UIHC in favor of "condition-specific" rehabilitation teams. The current model of rehabilitation at UIHC relies upon a physician referral from one of the medical or surgical units (Figure 1). There exists a wide variation in practice patterns by individual trauma surgeons, neurosurgeons, neurologists, hospitalists, etc., so that some patients may get early physical therapy referrals, other patients may be referred much later during their hospitalization, and unfortunately, some may not receive a referral. This may explain why our inpatient physical therapy staff is much smaller than comparable units in other academic health centers (University of North Carolina, University of Missouri, Mayo Clinic) and even our local community hospitals (Mercy—Iowa City, St. Lukes, Covenant Hospital). In addition, many patients do not get occupational therapy referrals, which may explain why we have fewer than six inpatient occupational therapy specialists staffing our traditional inpatient floors, while most other centers have over twenty, including those without inpatient rehabilitation units.



Figure 1.

When rehabilitation services are requested, a physician specializing only in rehabilitation does not coordinate the rehabilitation team members. A patient admitted to one of the ICUs may get some basic physical therapy (PT) services for range-of-motion exercises or stretching, but when the patient improves enough to be transferred to the general medical/surgical floor, usually a completely different team, another physical therapist and sometimes even a different attending physician will then resume medical or surgical treatment. Some physicians may also still feel that physical therapy could be delayed until after discharge from the intensive care unit settings, even though there have been documented studies of the loss in functional capacity of the musculoskeletal and cardiovascular systems.<sup>1</sup> Similar studies also show earlier achievement of functional milestones, improved satisfaction after uncomplicated coronary artery bypass graft (CABG) surgery, and therefore earlier discharges from an acute care hospital setting.<sup>2</sup>

Lack of involvement in physical medicine and rehabilitation is central to the problem of inconsistent physician referrals for physical therapy, under-utilization of physical therapy, and prolonged lengths of stay. Many academic medical centers have physicians in a Department or Division of Physical Medicine and Rehabilitation who are consulted when a patient with significant neuromuscular disease or disability is admitted to any service. This physician then coordinates the rehabilitation interventions for the patient throughout the hospitalization and even arranges outpatient follow-up in his/her rehabilitation clinic if needed. In the absence of this service, some non-rehabilitation physicians may lose interest or the ability to plan an appropriate discharge setting. This puts the social workers, nurses, physical therapists and occupational therapists in the awkward position of helping determine appropriate discharge recommendations and follow-up. The Continuum of Care Management Department has greatly helped in moving patients from UIHC to another setting, but this

system does not take into account how to get the patient back to UIHC for outpatient medical or rehabilitation follow-up.

In addition, many of our patients who are sent to an inpatient rehabilitation unit will need outpatient physical therapy, occupational therapy or speech therapy. These outpatient therapies are typically well-reimbursed by Medicare compared to inpatient rehabilitation services. Because UIHC does not have an inpatient rehabilitation unit, UIHC receives fewer referrals for outpatient stroke therapy compared with other local hospitals. There is a significant ability to improve our outpatient stroke rehabilitation offerings by increasing outpatient physical therapy, occupational therapy and speech therapy staffing. Because these patients require multiple rehabilitation disciplines within UIHC, they are best managed by a UIHC physiatrist and not by an outside referring physician.

In the recent UIHC practice to provide acute care hospital services and leave rehabilitation to local hospitals, we may inadvertently be sustaining significant costs by not capturing revenue from outpatient rehabilitation services. It is essential that we utilize and organize our rehabilitation inpatient and outpatient services effectively. This new model of rehabilitation care can improve our hospital operating margin by reducing length of stay and increasing our outpatient rehabilitation services.

In summary, concerns with the current model of rehabilitation at UIHC include: a) Relying upon individual physician prescribing patterns

for who gets PT/OT; b) A different therapist typically treats the patient on the floor after the intensive care unit stay; c) Weekend PT services are provided only if the potential for prolonged discharged would otherwise occur; d) Patient discharge planning is left to the primary physician, continuation of care manager, social worker, physical therapists and occupational therapists, and not a rehabilitation physician; f) No team-specific rehabilitation team – Rehabilitation physician, physical therapist, occupational therapist, social worker or registered nurse; g) UIHC lengths of stay that are greater than UIHC data for select populations; and h) Poor capture of outpatient PT and OT services after discharge from UIHC.

Therefore, we suspect that a Physical Medicine & Rehabilitation Consultation for all patients with neuro-musculo-skeletal impairments or disability as a part of early discharge planning would reduce length of stay for all inpatients by creating a care plan for rehabilitation, and allow an opportunity for nursing units, Continuum of Care navigators, the primary medical or surgical teams, and rehabilitation specialists to improve communication.



Figure 2.

### THE NEXT GENERATION MODEL: SPECIALIZED REHABILITATION SERVICE MODELS

Many hospitals abandoned the prior model of care 20 to 30 years ago when sufficient physical medicine and rehabilitation physicians became available, trained in the management of neuro-musculo-skeletal disease and disability. Some hospitals formed their own inpatient rehabilitation units managed by these physical medicine and rehabilitation physicians. Another state hospital, the University of Missouri in Columbia, partnered with HealthSouth Rehabilitation to provide rehabilitation care for most of their patients, while the Missouri Rehabilitation Center receives money from the Missouri Legislature to provide rehabilitation services for indigent residents of Missouri. Still other prominent rehabilitation hospitals such as the Rehabilitation Institute of Chicago, the Rehabilitation Institute of Michigan, the Charlotte Institute of Rehabilitation and the National Rehabilitation Hospital provide specialized rehabilitation centers while allowing acute care hospitals to focus on medical/surgical growth opportunities. Many of the hospitals that did not create their own rehabilitation units have created specialized hospital units trained to care for specific patient populations (Figure 2). The most common type of unit is a comprehensive stroke unit. There are also a number of specialized comprehensive geriatric units (or Acute Care for the Elderly –ACE units) in the country. As mentioned before, the Center for Disabilities and Development has developed a Pediatric Neuro-Trauma Rehabilitation Unit from a model of care that has been successful at the Denver Childrens Hospital for over 15 years.

### THE ROLE OF THE PHYSICAL MEDICINE AND REHABILITATION PHYSICIAN

Physical medicine and rehabilitation physicians provide a unique ability to thoroughly assess problems ranging from medical, surgical and psychosocial impairments that may impact the patient's ability to return to become a productive member of society. This includes the prevention of medical complications related to swal-

lowing problems (dysphagia or aspiration pneumonias), skin breakdown (costly pressure sores or wound treatments), venous thrombosis and pulmonary embolus, bowel and bladder dysfunction, malnutrition and pain. Evaluation of impairments in communication (speech therapy), mobility (physical therapy), cognitive deficit or visual and spatial deficiency (occupational therapy), psychological or emotional deficit, and sensory impairments are also important considerations in a patient's rehabilitation program. Psychosocial assessment and family/caregiver support and education on prognosis is vital at the early stages of a devastating neurological illness such as a spinal cord injury or traumatic brain injury. An assessment of function prior to entry into a formal inpatient rehabilitation program is also necessary and can best be provided by a physical medicine and rehabilitation physician coordinating communication among the primary medical and surgical teams, the nurses and rehabilitation specialists, the patient, and family.

#### **SPECIALIZED SERVICES: STROKE UNITS AND GERIATRIC TEAMS**

These comprehensive stroke units use "specialized stroke teams—an interdisciplinary approach to care, and a single unit where the patient remains in the same bed throughout the acute and rehabilitation stages of care." Commitment to the new delivery model by formal leaders, informal leaders, and front-line staff, as well as a supportive organizational structure, contributed to an expedited and successful implementation. Bisailon et al. showed that average length of stay is shorter than the national standard, and that provider and patient satisfaction has improved.<sup>3</sup> Ma et al. revealed in a randomized trial of either stroke unit or general ward for treatment of stroke, that stroke patients treated in a special stroke unit were able to return to normal daily activities earlier, with better social abilities and reduced neurological defects, without increasing the overall economic burden.<sup>4</sup>

A randomized controlled trial of 370 geriatric medical/surgical patients in an early-discharge rehabilitation service team setting used fewer days in hospital at three months (average nine days, median difference four days). This patient-centered service set clear goals, worked as a team, and considered physical, psychological, social and environmental issues. Cunliffe et al. concluded some older people can be discharged from the hospital sooner, with better health outcomes using a well-staffed and organized patient-centered early discharge service providing rehabilitation.<sup>5</sup>

#### **EARLY INITIATION OF THERAPY**

Physical therapy is typically started as early as possible and given as much as needed. The VA/Department of Defense Clinical Practice Guideline for the Management of Stroke Rehabilitation "strongly recommend(s) that rehabilitation therapy start as early as possible, once medical stability is reached." Cifu et al. demonstrate in a systematic review of 38 randomized control trials dating back to 1965, that early rehabilitation therapy appears to have a strong relationship with improved functional outcome at hospital discharge and follow-up.<sup>6</sup> Paolucci et al. also found a strong inverse relationship between the start date of rehabilitation and functional outcome.<sup>7</sup> The earliest starters had significantly higher effectiveness of treatment than did the medium or latest groups. Treatment initiated within the first 20 days was associated with a significantly high probability of excellent therapeutic response, and beginning later was associated with a poor response.

#### **INTENSITY OF THERAPY**

Two meta-analyses both concluded that greater intensity produces slightly better outcomes. Langhorne et al. found that intensive physiotherapy input was associated with a reduction in the combined poor outcome of death or deterioration and may enhance the rate of recovery.<sup>8</sup> Kwakkel et al.<sup>9</sup> reported a small but statistically significant intensity-effect relationship in the rehabilitation of stroke patients. Therefore the Clinical Practice Guideline recommendation is "that the patient receives as much therapy as needed to adapt, recover and/or reestablish the premorbid or optimal level of functional independence."<sup>10</sup>

#### **IMPROVED PATIENT SATISFACTION**

Improvements in patient satisfaction are usually intangible and difficult to measure using standard fiscal markers of return on investment. When a patient has a good experience during a hospitalization, this can lead to increased returns for elective procedures such as elective admissions, outpatient visits, and physical therapy and occupational therapy visits. Because UIHC does not have an inpatient rehabilitation unit, few patients return here for outpatient PT and OT. Furthermore, the costs of inpatient physical therapy and occupational therapy are included in the inpatient DRG payment while outpatient physical therapy and occupational therapy costs are reimbursed under Medicare Part B. When patients return to their dismissing rehabilitation facility for additional therapy instead of returning to UIHC, we lose further revenue. Development of additional specialized rehabilitation teams to span the continuum of inpatient and outpatient services are es-

sential for our state mission, to provide comprehensive health care to all Iowans, in addition to meeting patient expectations of our ability to offer the full continuum of health care services.

In summary, the benefits of specialized rehabilitation team acute care are: a) early physical medicine and rehabilitation assessment to provide care plan for rehabilitation; b) PT started as early as possible, given as much as needed (in ICU and on weekends); c) Decreased complications of immobility through early mobilization; d) Decreased length of stay; e) Increased elective admissions and outpatient PT/OT visits; f) Enhances state mission to provide comprehensive health care for all Iowans.

A current model for a specialized rehabilitation service is the Trauma Rehabilitation Consultation Service. This service involves a team-based approach including the trauma/burn surgeon, trauma/burn nurse, physical medicine and rehabilitation physician, medical social worker, physical therapist, occupational therapist and nutritionist/dietitian. When patients are admitted with severe neuro-musculo-skeletal injuries, the surgeons consult the physical medicine and rehabilitation physician in addition to implementing the standard physical therapy and speech therapy services. The physical medicine and rehabilitation physician is consulted on the patient and manages the overall rehabilitation care including PT and OT for these patients, throughout the patient's ICU stay, to the medical/surgical floor, and even to the housed outpatient floor if needed. Recommendations are made for whether patients are appropriate to transfer to acute inpatient rehabilitation facilities, subacute rehabilitation facilities, or outpatient rehabilitation. Follow-up visits into the rehabilitation medicine clinic are also arranged when patients have ongoing nerve or muscle injuries or need extensive outpatient rehabilitation services. The team meets weekly with the Trauma Service and the physiatrist frequently meets with the rehabilitation therapists more frequently, or even daily if needed.

**A FUTURE OF REHABILITATION: SPANNING THE CONTINUUM OF CARE**

Even the development of additional inpatient rehabilitation services would not bring us up to what will shape the future of rehabilitation care for an academic medical center. Many academic medical centers that already have specialized stroke units, geriatric units, or even inpatient rehabilitation units, are experimenting with a care process that expedites discharge from these units followed by outpatient day rehabilitation programs or other such services that allow patients to move through their continuum of care more quickly than

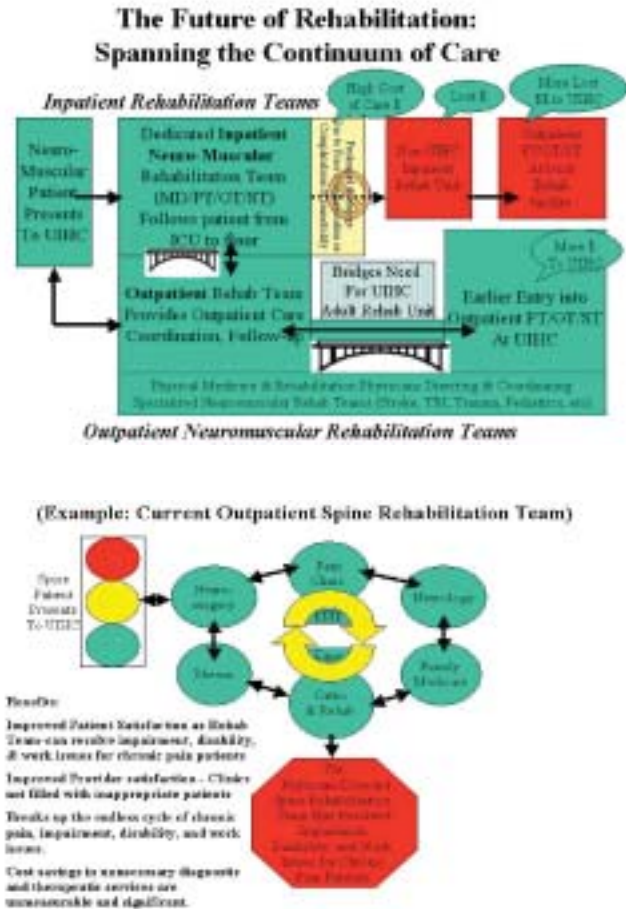


Figure 3.

before (Figure 3). In another study, Fjaertoft et al.<sup>11</sup> in 2003 studied 320 acute stroke patients who were randomized into an ordinary stroke unit service or a stroke unit with early supported discharge and further rehabilitation. The authors concluded that more patients treated in the early supported discharge setting were independent with this type of care compared to ordinary stroke unit care. These newest models of rehabilitative care represent the future standard in rehabilitation. We have an opportunity as well as a responsibility to provide this level of expert care to the residents of Iowa. Not only will this improve our patient care, but any costs will likely be offset in decreased lengths of stay through earlier discharge, increased outpatient revenues, or improved patient or provider satisfaction.

Fortunately, we are not alone when compared to other academic health centers in term of having specialized outpatient rehabilitation programs. In fact, many other academic health centers such as the University of North Carolina, Dartmouth and others, are trying to

develop an effective spine rehabilitation program for their chronic pain patients. Our Spine Rehabilitation Team has treated difficult, complicated chronic pain patients for almost 20 years. By using an interdisciplinary team including physical therapists, clinical psychologists, spine nurses, a medical social worker and a vocational counselor, we have provided cost-effective and clinically effective care for patients with chronic back pain, as revealed by Lanes et al.,<sup>12</sup> and Patrick et al.<sup>13</sup> Not only are these patients difficult from a medical or surgical evaluation standpoint, they typically have many medico-legal or psychosocial impairment and disability issues that play a significant role in the medical treatment of chronic pain.

Impairment and disability are words that generate little enthusiasm in many physicians. Many patients with chronic pain believe they are temporarily or permanently disabled from society's work force. A physician-led team of rehabilitation specialists knowledgeable of impairment and disability can resolve these issues, and rehabilitate a patient to still get back into the work force. When patients with chronic pain are seen by physicians unaware of impairment and disability issues, medical costs increase substantially due to inappropriate diagnostic testing, subspecialty consultations, or referrals for functional capacity evaluations. These chronic pain patients are frequently dissatisfied by bouncing among clinics in neurosurgery, anesthesia/pain, neurology, rheumatology, internal medicine and family medicine. When patients with significant neuromuscular impairment are sent to the housed outpatient unit, waiting up to 90 days for their disability determination, this also leads to significant costs to UIHC.

The Spine Rehabilitation Team model for treatment of chronic pain patients provides outpatient assessment and a team approach toward teaching a patient to manage chronic pain through an active exercise program and other pain- and stress-management exercises. Evidence-based medicine shows that treatment of chronic spine pain utilizing physical and cognitive-behavior interventions is just as effective as surgical treatment, as revealed by Keller and Brox et al.<sup>14</sup>

Patients with chronic pain and neuromuscular impairments are costly to UIHC. Chronic pain patients with disability issues are not patients that most departments want to return to their clinics. Management of these patients in a cost-effective and clinically effective manner is vital to our success. Without such a service, pa-

tients with chronic pain or musculoskeletal impairments would continue to seek and occupy outpatient clinics and housed outpatient units. Growth and expansion of services in Orthopaedics, Neurosurgery, Neurology, and the Pain Clinic at UIHC in these areas would be curtailed by these unnecessary visits. The Spine Rehabilitation Team's approach is interdisciplinary, remains patient-centered, improves patient satisfaction, and follows evidence-based guidelines for treatment of chronic pain, impairment and disability. This is exactly the model of care that hospitals and academic health centers should adopt for management of chronic musculoskeletal diseases and disabilities.

In summary, a model of rehabilitation at UIHC should include a specialized inpatient rehabilitation team with early discharge services based on diagnosis/impairments, focusing on: a) Patients receiving rehabilitation treatments based on diagnosis/impairments, not specific referring physician patterns; b) Early physical medicine and rehabilitation assessment to provide a necessary care plan for rehabilitation and improve communication among teams; c) Improved provider (MD/PT/OT/SW) satisfaction – development of specific rehabilitation teams; d) Decrease complications of immobility through early mobilization (PT, activity order); e) Improved patient satisfaction – developing a patient-centered approach; f) Decrease length of stays, bring level of stay to below UIHC standards.

The model will also increase specialized outpatient rehabilitation services like the spine rehabilitation team, focusing on: a) Improved capture of UIHC elective outpatient PT/OT services after supported inpatient discharge, bypassing the need for UIHC Inpatient Rehabilitation Unit; b) Unmeasurable potential financial benefits in increased outpatient PT/OT revenues, avoidance of lost revenues due to current loss in outpatient PT/OT referrals, reduction of expenses (housed outpatient unit), avoidance of increased expenses in management of preventable recognized medical complications (pressure ulcers, DVTs/Pulmonary emboli, aspiration pneumonias, etc. and; c) patient satisfaction.

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