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### Authors

Miclau, Theodore

Pascual, Lisa

Ndoja, Silvio

et al.

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# Rehabilitation after musculoskeletal injury: an overview of systems in the United States and Canada

Theodore A. Miclau, MS<sup>a,\*</sup>, Lisa Pascual, MD<sup>b</sup>, Silvio Ndoja, MD<sup>c</sup>, Abigail Frazer, MDCM<sup>d</sup>, Lauren Beaupre, PT, PhD<sup>e</sup>, Emil H. Schemitsch, MD, FRCS(C)<sup>f,g</sup>

**Abstract** As North America is largely industrialized with a variety of available private transportation options, trauma is a common occurrence, resulting in significant burdens of disability and costs to the health care system. To meet increasing trauma care needs, there is a robust organization of trauma and rehabilitation systems, particularly within the United States and Canada. The American and Canadian health care systems share multiple similarities, including well-equipped Level I trauma centers, specialized inpatient rehabilitation units for polytrauma patients, and thorough evaluations for recovery and post-discharge placement. However, they also have several key differences. In Canada, the criteria for admission to inpatient rehabilitation vary by location, and inpatient rehabilitation is universally accessible, whereas outpatient rehabilitation services are generally not covered by insurance. In the United States, these admission criteria for post-acute inpatient rehabilitation are standardized, and both inpatient and outpatient services are covered by private and government-funded insurance with varying durations. Overall, both health care systems face challenges in post-acute rehabilitation, including benefit limitations and limited provider access in rural areas, and must continue to evolve to meet the rehabilitation needs of injured patients as they reintegrate into their communities.

**Key Words:** International Orthopaedic Trauma Association, rehabilitation systems, trauma centers

## 1. Introduction

Trauma is a common occurrence in North America because its countries are highly industrialized and offer multiple private transportation options. To meet the care needs of these trauma patients, there is a robust organization of trauma and rehabilitation systems in North America, although they differ widely in form across the continent. This article will provide an overview of the rehabilitation systems and practical delivery of this care in North America, specifically within the United States and Canada.

## 2. Rehabilitation Systems: United States

### 2.1. Overview

In the United States, the rehabilitation program is divided into rehabilitation in the acute hospital setting (ie, trauma center) and post-acute setting. Post-acute rehabilitation may occur in varying inpatient and outpatient settings depending on the patient's needs.

**2.1.1. Epidemiology of Trauma and Disability.** Trauma has been one of the leading annual causes of death and disability in the United States for many years.<sup>1</sup> Greater than 50% of hospitalized trauma patients are afflicted by one or more musculoskeletal injuries.<sup>2</sup> The number of individuals living with disabilities in the United States is often underappreciated. The Centers for Disease Control and Prevention report that as of 2020, more than 1 in 4 individuals identifies as having a disability, which accounts for 64 million people.<sup>3</sup> On a more granular level, it is estimated that greater than 11.1% of adults suffer from a mobility-related disability and another 11% exhibit cognitive impairments.<sup>4</sup>

**2.1.2. Trauma Center Level Designations.** The designation of definitive trauma care facilities is an essential step toward developing an effective trauma care system.<sup>5</sup> In the United States, the American College of Surgeons (ACS) formed the ACS Committee on Trauma (ACS-OT) that defines trauma facility standards and provides guidelines that classify every

The authors declare that they have no conflicts of interest.

<sup>a</sup> School of Medicine, University of California San Francisco, San Francisco, CA, <sup>b</sup> Department of Orthopaedic Surgery, Orthopaedic Trauma Institute, Zuckerberg San Francisco General Hospital, University of California, San Francisco, San Francisco, CA, <sup>c</sup> Division of Orthopedic Surgery, Department of Surgery, Western University, London, ON, Canada, <sup>d</sup> Faculty of Medicine, McGill University, Montréal, QC, Canada, <sup>e</sup> Faculty of Rehabilitation Medicine, University of Alberta, Edmonton, AB, Canada, <sup>f</sup> Orthopaedic Biomechanics Lab, Victoria Hospital, London, ON, Canada, <sup>g</sup> Division of Orthopaedic Surgery, Western University, London, ON, Canada

\* Corresponding author. Address: Orthopaedic Trauma Institute, 1001 Potrero Ave, San Francisco CA 94110. E-mail address: tmiclau@alumni.stanford.edu (T. A. Miclau).

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trauma center into one of several levels depending on their available assets.<sup>5,6</sup> Per recent ACS 2022 guidelines, trauma centers are designated between Level I and Level III, with Level I trauma centers being the largest and most resource-rich and Level III trauma centers being the smallest and with the fewest available resources.<sup>6</sup> The goal of this classification system is to delineate the necessary resources to provide optimal, cost-effective care to injured patients within an adequately designed and funded care system.<sup>5</sup>

**2.1.3. Rehabilitation Criteria for Trauma Centers.** Each trauma center's designated level is influenced by its capacity for rehabilitation services.<sup>5,6</sup> Factors that the ACS-OT considers for classification include composition of in-hospital rehabilitation team, role and relationship of the rehabilitation services to the trauma service, presence of a dedicated social worker for the trauma service, availability of a mental health screening program and other support services, and presence of a dedicated rehabilitation facility.

All trauma centers must meet the rehabilitation needs of trauma patients both during and after their acute inpatient stay, which includes a determination of an appropriate post-discharge level of care and rehabilitation services.<sup>6</sup> An early multidisciplinary assessment of trauma patients to manage complex rehabilitation needs and provide relevant services during the acute phase of care is essential to optimize functional recovery.<sup>6</sup> These needs should be addressed as soon as medically and logistically feasible during the initial hospitalization.<sup>6</sup> The appropriate medical setting and next level of rehabilitation care can then be determined based on patients' functional and medical needs.<sup>4</sup>

More specifically, Level I and II trauma centers must use rehabilitation services within the hospital's physical facilities or as a freestanding rehabilitation hospital with transfer agreements in place.<sup>5</sup> These centers must also offer rehabilitation consultation services, occupational therapy, speech therapy, physical therapy, and social services in the acute phase of care, including intensive care.<sup>5</sup> Level III trauma centers are required to provide both physical therapy and social services.<sup>5</sup> Every trauma center must implement policies for proper transfer into a rehabilitation facility and appropriate follow-up after discharge from the facility.<sup>5</sup>

## 2.2. Rehabilitation Team

Trauma patients have diverse rehabilitation needs that require collaboration among an organized multidisciplinary team.<sup>5</sup> As noted previously, the rehabilitation team may vary depending on the trauma center level and resources. This team includes but is not limited to physicians, nurses, occupational therapists, physical therapists, speech-language pathologists, respiratory therapists, orthotists, prosthetists, mental health providers, and case managers.<sup>4</sup> Likewise, the extent of the rehabilitation team also varies in the post-acute setting, depending on the intensity of the rehabilitation program, with the inpatient rehabilitation facility (IRF) frequently offering the widest range of rehabilitation specialists and resources. Rehabilitation program success is contingent on major commitments from both the patient and the program. Roles of the multidisciplinary team members are as follows<sup>4,5</sup>:

**2.2.1. Physicians.** Rehabilitation teams are most frequently led by physicians with residency training in physical medicine and rehabilitation (PM&R), also called physiatrists. In conjunction

with the patient and the rehabilitation team, physiatrists set recovery goals by developing comprehensive treatment plans and coordinating services aimed at improving function and quality of life.

**2.2.2. Rehabilitation Therapists.** Patients in rehabilitation programs work closely with multiple therapy teams, most commonly occupational therapy (OT), physical therapy (PT), and speech-language pathology (SLP). OT helps to increase function in patients who are impaired in activities related to daily living (ADLs) and instrumental ADLs (IADLs). For example, occupational therapist's work may include improving patients' hand-eye coordination, fine motor skills, and use of appropriate equipment or devices to facilitate independence. PT serves to restore strength, range of motion, gross motor skills, and use of ambulatory devices to patients with mobility impairments. SLP evaluates and treats patients with deficits in cognition, communication, speech, and/or swallowing.

**2.2.3. Nursing Staff.** Rehabilitation nurses (RNs) are nursing professionals who specialize in rehabilitation and are crucial members of IRF programs. Beyond nursing degrees, they are trained to educate and treat patients with physical impairments and disabilities, addressing their unique medical needs through wound care, bowel and bladder training, and prevention of rehabilitation-related medical sequelae.

**2.2.4. Additional Support Staff.** Other members of the rehabilitation team include case managers, social workers, orthotists, prosthetists, respiratory therapists, nutritionists, patient care technicians, pharmacists, and mental health providers (eg, psychologists).

## 2.3. Rehabilitation Standard Assessments

During post-acute inpatient stays, patient progress is evaluated using objective functional outcome measurements.<sup>7</sup> For many years, IRFs used the Functional Independence Measure (FIM). However, because the FIM was not widely used in skilled nursing facilities (SNFs) or home health agencies, functional outcomes could not be tracked across different post-acute settings. Therefore, in 2019, the new gold standard became the Continuity Assessment Record and Evaluation (CARE) item set,<sup>7</sup> which was designed to standardize the assessment of patients' medical, functional, cognitive, and social support status across both acute and post-acute settings.<sup>8</sup> Several studies demonstrated that the CARE tool is predictive of length of stay in inpatient rehabilitation and a valid, reliable instrument for rehabilitation functional assessment, including measures of mobility and self-care outcomes in post-acute settings.<sup>7,9</sup> Widespread implementation of CARE may help streamline the assessment and treatment planning process.<sup>9</sup> Currently, there are no mandatory quality-of-life assessments for rehabilitation patients in the United States.

## 2.4. Rehabilitation Training

Physiatrists can receive further subspecialty training through 1- to 2-year fellowships after residency, which include American Board of Physical Medicine and Rehabilitation (ABPMR)-certified programs such as brain injury medicine, neuromuscular medicine, pain medicine, pediatric rehabilitation medicine, spinal cord

injury medicine, and sports medicine. Non-ABPMR–certified fellowship training includes musculoskeletal/spine fellowships, stroke, multiple sclerosis, neurorehabilitation, electrodiagnostic medicine, cancer rehabilitation, occupational and environmental medicine, and movement disorders. Therapy specialists, including physical therapists, occupational therapists, and speech-language pathologists, may also work toward specialty certifications.

**2.4.1. Specific Rehabilitation Programs.** There are specialized medical rehabilitation programs in multiple settings and specialty areas, notably within large IRFs. These include programs related to pediatrics, amputation, brain injury, spinal cord injury, stroke, and cancer rehabilitation.<sup>4,5</sup> Some programs may seek accreditation by the Commission on Accreditation of Rehabilitation Facilities (CARF), a non-profit accreditor of health and human services. Accredited organizations must meet person-focused standards set forth by CARF to promote quality, value, and optimal outcomes of services.

## 2.5. Post-Acute Rehabilitative Care

Trauma patients should be considered for the next level of rehabilitation care early in the hospital stay. Discharge disposition will depend on patients' medical needs, caregiver support system, home environment, functional status, and ability to actively participate and benefit from a rehabilitation program. Options include a long-term acute care hospital, IRF, skilled nursing facility, home with in-home therapies, or outpatient rehabilitation.<sup>6</sup> Each level of care has specific criteria for eligibility and must adhere to facility regulatory requirements as set forth by the Center for Medicare and Medicaid Services.<sup>4,10–12</sup>

**2.5.1. Long-Term Care Hospital.** Also known as a “subacute” hospital, this hospital treats patients whose medical status is relatively stable, but who still require complex care services that would exceed the capabilities of an IRF or skilled nursing facility (noted below). Patients require at least 25 days of anticipated hospitalization to be considered for admission. Patients who qualify for this level of care typically demonstrate at least 2 active medical issues, such as complex wound or burn care, ventilator weaning, and respiratory support.

**2.5.2. Inpatient Rehabilitation Facility.** This hospital-based rehabilitation setting provides intensive rehabilitation services that use an interdisciplinary team approach. IRFs offer at least 15 hours of therapy per week, 24-hour rehabilitation nursing care, and 24-hour access to a physician. The rehabilitation program is directed by a physician with special training in rehabilitation (eg, physiatrist). Patients who require extensive nursing care, complex medical management, and rehabilitative needs from multiple therapy disciplines are candidates for IRF admission. During IRF stays, patients must demonstrate (1) a need for ongoing intensive rehabilitation services and (2) measurable, functional improvements that are sustainable and practical for community discharge.

**2.5.3. Skilled Nursing Facility.** SNFs offer long-term, post-acute care to patients who are deemed by a physician to benefit from daily skilled nursing care and/or rehabilitation therapy. Examples of skilled nursing care include intravenous therapy, catheter care,

continual monitoring of vital signs, and use of medical equipment.

**2.5.4. Home Health.** Home health is designed for patients who depend on intermittent skilled nursing services and rehabilitation therapy care but have difficulties leaving their home independently to access care (“homebound”). Once patients are no longer homebound, they are ineligible for ongoing home services and may transition to outpatient rehabilitation for ongoing therapy as needed.

**2.5.5. Outpatient Rehabilitation.** Outpatient rehabilitation services include PT, OT, and SLP.

## 2.6. Access to Rehabilitation Services

Funding for post-acute rehabilitation services depends on the individual's insurance coverage. Payer sources may include private insurance, Medicaid (government-sponsored insurance for limited-income individuals that meet eligibility criteria), and Medicare (federal health insurance for individuals older than 65 years). Variability in the type of plan and benefits available is often a source of confusion for both the patient and the insurer.<sup>13</sup> The need for copayments and preauthorization has become the standard. Outpatient rehabilitation is available through Medicaid, but the number of treatments may vary significantly between states; for Medicare, the number of treatments for a given diagnosis is capped. Access to services may be limited in rural areas, both as a function of distance and limited number of available providers. Since the pandemic, telehealth has emerged as a potential means to bridge this gap.

## 2.7. Conclusion

In the United States, trauma is a frequent occurrence and the number of individuals living with disabilities remains underestimated. To care for trauma patients who require rehabilitation, trauma centers are designated and classified into different levels (I-III) based on their size and available resources. Because rehabilitation is expected to occur in both acute and post-acute settings, trauma patients undergo early multidisciplinary assessments to determine their post-acute level of care and associated rehabilitation services. These assessments are performed by the trauma center's rehabilitation team, comprising nurses, therapists, and physicians with specific training in rehabilitation. Specific post-acute rehabilitation settings include the long-term care hospital, IRF, SNF, home health, and outpatient rehabilitation. Patients' health and functional progress may be assessed across rehabilitation settings using the CARE item set. Efforts to establish specialized regional rehabilitation centers and expand training programs for rehabilitation providers may further enhance recovery, improve quality of life, and promote societal reintegration among trauma patients in the United States.

## 3. Rehabilitation Systems: Canada

### 3.1. Overview

Health care in Canada is funded by the federal government and administered by the provincial and territorial governments.<sup>14</sup> There is no unified consensus on what rehabilitation services are publicly funded at a provincial level. However, there are some

commonalities: Inpatient rehabilitation is covered while outpatient rehabilitation varies by province, injury, and/or supplemental coverage.<sup>15–27</sup> Most provinces have a dedicated rehabilitation hospital or unit which can service intensive rehabilitation for polytrauma patients. Specialized services exist for spinal cord injuries, traumatic brain injuries, and geriatric patients. Despite the variability in outpatient rehabilitation, injured patients in Canada have free access to acute rehabilitation.

**3.1.1. Trauma Centers.** While Canada is a large country, most patients live in urban areas.<sup>28</sup> This results in most injured patients being treated in Level 1 trauma centers. Typically, trauma patients are assessed and evaluated by the trauma team. The trauma team comprises a multidisciplinary team lead by the trauma team leader (TTL).<sup>29,30</sup> Composition is variable, but typically, general surgery and anesthesia are core members. Orthopaedics is part of the trauma team in some institutions. If the patient is found to have multisystem injuries, then typically, primary care of the patient is assumed by the trauma team with the various specialist teams following closely. If a patient has an isolated injury, orthopaedic or not, then care is assumed by the relevant specialist service.

Trauma centers are typically well equipped with a multidisciplinary team of allied health professionals to care for the injured patient—operative and nonoperative.<sup>15–27</sup> These include but are not limited to physiotherapists, occupational therapists, social workers, and dieticians. The patient is assessed, and followed closely, by this team of specialists in their early trajectory which is discussed in daily multidisciplinary meetings. Based on the collective evaluations, the patient's trajectory is assessed. The level of rehabilitation is determined for the injured patient to be safe and functional at home. This will depend on their level of home supports, living situation, and functional abilities. Based on this assessment, there are 3 possible dispositions: home with supports, continued inpatient rehabilitation, or long-term care (LTC).

### 3.2. Rehabilitation Standard Assessments

If the patient is not making, nor expected to make functional gains, the patient's care is then focused toward a long-term care disposition or home with significant care. This is not a focus of this article and will not be elaborated on. If it is deemed that the patient is making significant improvements with acute care rehabilitation and will be safe in their home with some support, then arrangements will be made for discharge from acute care. This can include outpatient support in the forms of equipment and/or services. If the patient is progressing with their rehabilitation and will require extensive rehabilitation before achieving a functional level, then applications will be made for transfer to specialized rehabilitation units, particularly for complex injuries such as spinal cord injuries and traumatic brain injuries.

### 3.3. Post-Acute Rehabilitative Care

**3.3.1. Specialized Inpatient Services.** All provinces in Canada have either a specialized hospital or unit for focused rehabilitation.<sup>15–27</sup> These centers are typically overseen by a physiatrist and may include a hospitalist. While a study in Toronto showed a decrease in patient length of stay with the introduction of acute

physiatry consultation,<sup>31</sup> physiatrists are primarily found in rehabilitation centers working in a multidisciplinary team. The number of allied health services may be higher than in acute care hospitals. If it is deemed that the patient will need intensive rehabilitation to reach a safe functional status, arrangements are made for the patient to be transferred to a rehabilitation hospital/wing. The transfer occurs once the patient is deemed medically stable. An application is made, which includes allied health reports, to begin the transfer process. Admission to these specialized units is dependent on capacity.

Admission criteria to specialized rehab centers vary. They generally depend on the injured patient's primary location of residence. Specific injuries such as spinal cord or traumatic brain injuries, amputation, and pediatric rehabilitation have a wider geographical catchment area. This is because of the specific rehabilitation requirements of these patient populations. In most cases, patients requiring functional rehabilitation are cared for in the closest geographical area in which they reside. This allows patients to be closer to their social support network while also optimizing capacity. Those living close to trauma centers are not negatively affected because of the local rehabilitation centers being at capacity caring for patients from other regions, when those patients could be well cared for by their local institutions.

However, there is substantial variability across provinces in access to inpatient rehabilitation, especially in provinces with higher proportions of rural residents. For rural Canadians recovering from trauma, transfers commonly occur to smaller regional hospitals closer to the patient's home.<sup>32</sup> These smaller centers are typically overseen by a hospitalist and may only have physiotherapy services without access to other allied health professionals.

The duration of inpatient rehabilitation is dependent on multiple factors. These include but are not limited to the degree of social support the patient has at home, their living situation (eg, if they have stairs or not), and their baseline and current functional status. Once the allied health team determines that a patient has achieved a safe functional capacity, they are discharged home. Patients discharged from hospital may qualify for outpatient services and equipment based on their functional capabilities. The degree of services offered will depend on allied health assessment, local government funding, and regional availability to provide these services.

**3.3.2. Outpatient Services.** Outpatient rehabilitation is where the Canadian health care system particularly falls short. While all provinces, to a degree, provide coverage for outpatient physiotherapy, access remains a problem.<sup>15–17,33–43</sup> Services are often fraught with long waiting lists and are difficult to access. Private physiotherapy is more accessible, provided patients have the financial means or private insurance.

Non-government-covered physiotherapy can be funded out of pocket by patients or through a type of insurance. For patients who have sustained injuries in a motor vehicle collision, rehabilitation is covered through motor vehicle insurance—even if the injured patient was not driving the vehicle. However, this coverage requires a significant amount of paperwork, for both patients and physicians. In addition, not all outpatient rehabilitation facilities accept direct payments from insurance companies, necessitating payment by the patient for services that the patient can then claim. Depending on their social circumstances, this can be a financial barrier for patients. The other most common type of non-government insurance is workplace

insurance. If a patient is injured in the workplace, there is typically coverage through a workplace insurance program. While these programs have coverage for extra services, they are geared to a return-to-work focus and are administered in specialized clinics which are equipped for work-based assessments.

**3.3.3. Specialized Outpatient Programs.** Injured patients may have access to specialized outpatient programs. These are often limited to specialized patient populations: pediatrics, geriatrics, amputees, with spinal cord injuries, or with traumatic brain injuries. These clinics can follow patients once discharged from hospital to ensure they are progressing with their recovery.

### 3.4. Conclusions

For the most part, Canada has a robust inpatient rehabilitation process for injured patients. Specialized patient populations, such as spine, pediatric, spinal cord injury, traumatic brain injury, and amputee, have wider access to specialized units. Patients who do not fall in these categories but need inpatient rehabilitation may have different levels of access to inpatient rehabilitation depending on their geographical location. Nevertheless, inpatient rehabilitation is accessible and free.

Outpatient access for rehabilitation is lacking in Canada. Generally, outpatient rehabilitation is not covered in our “universal” health care system. Patients have inconsistent access to services and, when available, may not even have the financial means. Future improvements need to focus on outpatient resources, to ensure that appropriate rehab care is provided in and out of the hospital.

## 4. Summary

This article reviewed the existing trauma and rehabilitation systems in the United States and Canada, 2 of the largest countries in North America. There are significant similarities between the American and Canadian systems, which include the presence of well-resourced Level I trauma centers and availability of specialized inpatient rehabilitation units for the care of polytrauma patients, thorough evaluations of hospitalized patients to assess recovery trajectory and appropriate post-discharge placement, multiple post-discharge placement options, and typical composition of the inpatient rehabilitation teams. There are also certain areas in which they vary, most notably with respect to access. In Canada, admission criteria to specialized rehabilitation centers vary and depend in part on the patient’s location of residence. In addition, inpatient rehabilitation is both accessible and free because of coverage under the universal Canadian health care system, but outpatient rehabilitation is generally not covered by government-funded insurance. By contrast, in the United States, the criteria for transfer to post-acute inpatient rehabilitation are standardized. Regarding insurance coverage, both private and government-funded insurances provide access to outpatient services, although the exact duration of services varies based on insurance type. Notably, both the United States and Canada share complex challenges relative to post-acute rehabilitation, particularly in the outpatient setting, because they relate to the absence or limitation of benefits, financial complexities of using benefits, and limited access to providers, particularly in rural regions. Given the significant burdens of disability and costs related to trauma, both systems must continue to evolve to

manage the rehabilitation needs of the injured patients as they recover in their communities.

Given the review nature of our manuscript, the work was exempt from human or animal ethics requirements because it does not involve human or animal subjects.

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