



Synergizing Emergency Medical Services, Orthopedic Treatment, Patient Care, and Physiotherapy for Effective Trauma Rehabilitation

Mohammed Jassim Alhassan^{1*}, Afaf Jawad Aljandal², Manal Ebrahim Alghanim³, Zahrah Abdulmohsen Ali Alrashed⁴, Alsheikh, Basem Nasser A⁵, Awwadh Mukhlid Halal Almutairy⁶, Taleb Abdulwahab AlBohassan⁷, Mahdi Ali Alkashi⁸, Ali Qassim Alessa⁹, Hussain Ali Alshikhali¹⁰

¹Medical Student, College of Medicine, King Faisal University, Al Ahsa, Saudi Arabia

* **Corresponding Author Email:** jassi2m@gmail.com - **ORCID:** 0000-0002-5247-0050

²Patient care technician, Maternity and Children hospital

Email: afa2f@gmail.com - **ORCID:** 0000-0002-5247-0150

³Patient care technician, Maternity and Children hospital

Email: mana2l@gmail.com - **ORCID:** 0000-0002-5247-0250

⁴Patient care technician, Maternity and children hospital Alahsa

Email: zahra2h@gmail.com - **ORCID:** 0000-0002-5247-0350

⁵Physiotherapy technician, Qatif Central Hospital

Email: base2m@gmail.com - **ORCID:** 0000-0002-5247-0450

⁶Emergency Medical Services technician, Saudi Red Crescent Authority

Email: awwad2h@gmail.com - **ORCID:** 0000-0002-5247-0550

⁷Emergency Medical Services technician, Saudi Red Crescent Authority

Email: tale2b@gmail.com - **ORCID:** 0000-0002-5247-0650

⁸Emergency Medical Services technician, Saudi Red Crescent Authority

Email: mahd2i@gmail.com - **ORCID:** 0000-0002-5247-0850

⁹Emergency Medical Services technician, Saudi Red Crescent Authority

Email: qassi2m@gmail.com - **ORCID:** 0000-0002-5247-0050

¹⁰Emergency Medical Services technician, Saudi Red Crescent Authority

Email: hussai2n@gmail.com - **ORCID:** 0000-0002-5247-3350

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Abstract:

In the realm of trauma rehabilitation, the synergistic integration of Emergency Medical Services (EMS), orthopedic treatment, patient care, and physiotherapy is paramount to achieving optimal recovery outcomes. Effective trauma management begins in the pre-hospital setting, where EMS professionals play a critical role in stabilizing patients and ensuring seamless transitions to medical facilities. Once in the hospital, orthopedic treatment focuses on addressing musculoskeletal injuries through surgical and non-surgical interventions, aiming to restore functionality. This is complemented by patient care initiatives that prioritize personalized treatment plans, providing psychological support, and managing pain to foster an environment conducive to healing. By creating a holistic framework that combines these elements, healthcare providers can significantly enhance the rehabilitation process for trauma patients. The collaboration between different healthcare specialists is vital for effective patient rehabilitation, as it ensures that individuals receive comprehensive care tailored to their specific needs. Physiotherapists work closely with orthopedic specialists to design targeted rehabilitation programs that emphasize mobility, strength, and overall physical function. Early intervention with physiotherapy, after orthopedic procedures or during the recovery phase, can prevent complications such as stiffness or loss of muscle mass, ultimately leading to quicker and more successful rehabilitation. Additionally, ongoing

communication between all stakeholders involved in the patient's recovery ensures that treatment adjustments can be made as necessary, optimizing outcomes. Overall, the synergistic approach to trauma rehabilitation reinforces the importance of each discipline and enhances patient experience, leading to a more functional and independent lifestyle after recovery.

1. Introduction

Trauma, in its myriad and violent forms, stands as one of the most formidable and persistent challenges confronting modern global health. It is a universal phenomenon, disregarding boundaries of geography, economy, and age, leaving in its wake a devastating trail of human suffering and systemic strain. As a leading cause of mortality worldwide, particularly among younger populations, its immediate lethality is only the most visible tip of a colossal iceberg [1]. Beneath the surface lies the extensive burden of morbidity—the complex fractures, the spinal cord injuries, the traumatic brain injuries, and the severe soft tissue damage—that culminates in long-term, often permanent, disability. This disability reverberates through every facet of human existence, extinguishing potential, dismantling livelihoods, and transforming the lives of victims and their families into enduring narratives of physical limitation and psychological distress [2]. The economic calculus is equally staggering, encompassing not only the direct costs of acute medical care, surgical intervention, and protracted rehabilitation but also the indirect costs of lost productivity, disability benefits, and the unquantifiable depletion of social and human capital.

The journey from the catastrophic moment of injury to the desired destination of restored function and meaningful reintegration into society is, for the patient, a labyrinthine odyssey. It is a path characterized not by a straightforward, linear progression but by a non-linear and unpredictable trajectory fraught with potential setbacks, complications, and critical decision points. Each phase of this journey—from the chaotic pre-hospital environment through the intense focus of operative repair, into the challenging weeks of inpatient recovery, and onward through the long months of outpatient rehabilitation—presents unique vulnerabilities. A misstep at any juncture, a gap in communication, or a delay in intervention can cascade into poorer outcomes, diverting the patient's path toward a diminished quality of life. Historically, the healthcare system's approach to navigating this complex journey has been paradoxically simplistic: a model of fragmentation and sequential handoffs. In this traditional paradigm, the continuum of care is partitioned into

rigid, siloed specialties, each operating with its own priorities, protocols, and perceptions of endpoint. Emergency Medical Services (EMS) personnel, the first responders, act with the paramount goals of preserving life and preventing further harm during extrication and transport, often with limited context for the long-term rehabilitation plan. Upon delivery to the hospital, the baton is passed to the trauma and orthopedic surgery teams, whose expertise is rightfully concentrated on the technical mastery of anatomical restoration—stabilizing fractures, repairing vessels, and debriding wounds. Their success is frequently measured by radiographic alignment and wound closure. The patient then enters the domain of inpatient nursing and allied health care, a phase focused on managing pain, preventing complications, and meeting fundamental needs. Finally, often seen as the subsequent and separate stage, physiotherapy and rehabilitation medicine are engaged to address the resulting functional deficits. This sequential, assembly-line model operates with inherent weaknesses: limited communication between stages, a lack of shared vision for the patient's ultimate functional goals, and the absence of a unified guiding philosophy that connects the urgent life-saving maneuvers at the roadside to the meticulous work of reteaching a muscle to fire or a brain to recalibrate movement [3].

The consequences of this disjointed approach are both measurable and profound. Clinically, they manifest as gaps in care where critical information is lost in handoff, leading to duplicated efforts or missed warning signs. They appear as suboptimal functional outcomes—a stiff joint from delayed mobilization, a weakened limb from prolonged immobilization, or a gait abnormality that becomes entrenched because compensatory patterns were not corrected early. They result in prolonged recovery times and increased lengths of hospital stay, as preventable complications like infections, deep vein thromboses, or severe pain syndromes arise and must be managed [4]. From the patient's perspective, this fragmentation often translates into confusion, frustration, and a profound sense of alienation within a system that feels impersonal and inefficient. They are required to repeatedly narrate their story, to navigate conflicting advice, and to bridge, on their own, the conceptual chasm between the saving of their life and the rebuilding of their living.

It is from the critical recognition of these systemic failures that the contemporary paradigm in trauma care is undergoing a necessary and radical evolution. The emerging imperative is a fundamental shift from a fragmented, specialty-centric model to a synergistic, patient-centered continuum. This new paradigm envisions a seamless tapestry of care, woven from the moment of injury forward, integrating the critical domains of pre-hospital response, definitive orthopedic and surgical treatment, holistic inpatient and outpatient care, and structured, science-driven physiotherapy into a coherent, dynamic whole [2]. This is not merely an administrative realignment but a philosophical transformation. It champions the concept that effective rehabilitation is not a distinct phase that commences only after the “real” medical work of surgery is complete. Instead, it posits that rehabilitation is a philosophy of care—a mindset of functional optimization—that must be initiated at the very scene of the injury and consciously sustained through every subsequent interaction [5]. The potential benefits of such synergy are multifold and operate on physiological, functional, and psychosocial levels. Physiologically, coordinated care optimizes the environment for healing by ensuring timely interventions that reduce secondary injury, manage the systemic inflammatory response, and provide the nutritional and metabolic support required for repair. Functionally, it maximizes recovery by ensuring that mobility and strength retraining begin at the earliest biologically safe moment, preventing the debilitating effects of immobility and capitalizing on neuroplasticity. It systematically mitigates complications through proactive, shared vigilance and protocolized prevention strategies. Perhaps most importantly, it addresses the often-neglected psychosocial dimensions of trauma by embedding psychological support, patient education, and goal-setting throughout the journey, fostering resilience, self-efficacy, and active participation in the recovery process [5].

2. Emergency Medical Services as the Critical First Link

The initial assessment performed by EMS providers utilizes standardized tools like the Glasgow Coma Scale, mechanism of injury analysis, and vital sign monitoring to identify life-threatening conditions and the severity of musculoskeletal injuries [3]. Accurate triage decisions, such as directing a patient with a suspected pelvic fracture or multisystem trauma to a designated Level I Trauma Center, are paramount. This ensures immediate access to specialized resources, including

orthopedic trauma surgeons and interventional radiology, thereby reducing the time to definitive care—a key determinant in outcomes for injuries like femoral neck fractures or open fractures [4]. Furthermore, early identification of neurovascular compromise in limb injuries communicated ahead to the trauma team can expedite surgical planning. Appropriate pre-hospital management of orthopedic injuries is a cornerstone of preventing secondary injury. The judicious use of splinting, traction splints for femoral fractures, and pelvic binders for unstable pelvic ring injuries serves to stabilize fracture fragments, control pain, reduce hemorrhage, and prevent further damage to adjacent nerves, blood vessels, and soft tissues [5]. For spinal trauma, meticulous immobilization using cervical collars and long spine boards, while evolving in technique, remains crucial to prevent catastrophic neurological deterioration. These interventions directly preserve the biological environment for future healing and reduce the complexity of subsequent surgical repair. Effective pain management initiated in the pre-hospital setting is both a humanitarian imperative and a clinical strategy. The administration of analgesics reduces the physiological stress response, which can exacerbate shock and catabolism [6]. Moreover, clear, structured communication from EMS to the receiving trauma team, often via standardized protocols or radio report, is the first handoff in the rehabilitation continuum. A concise report detailing mechanism, injuries found, vital trends, and treatments given (e.g., “62-year-old female, fall from height, suspected right hip fracture, pain score 8/10, 5mg morphine administered, pelvis immobilized”) facilitates team preparedness and eliminates redundancy, ensuring a seamless transition to the emergency department [7].

Orthopedic intervention represents the pivotal point where anatomical disruption is addressed. The surgical philosophy and techniques employed must be viewed not as an endpoint, but as a procedure designed to facilitate the earliest and most effective mobilization and rehabilitation possible. Modern orthopedic trauma surgery has progressed from the simple goal of bony union to a more nuanced objective of creating a construct that enables immediate or early protected weight-bearing and joint motion. The principles of fracture fixation reflect this shift. Intramedullary nailing for tibial and femoral shaft fractures provides load-sharing stability, often allowing early knee and hip movement and progressive weight-bearing [8]. Minimally invasive plate osteosynthesis (MIPO) techniques preserve the fracture hematoma and periosteal blood supply, crucial for bone healing,

while minimizing soft tissue trauma, which in turn reduces post-operative pain and facilitates earlier initiation of physiotherapy [9]. The choice of implant and approach is thus made with the rehabilitation pathway in mind.

3. Damage Control Orthopedics and Staged Reconstruction

In the polytrauma patient, the concept of Damage Control Orthopedics (DCO) exemplifies integration with systemic patient care. Recognizing that prolonged initial surgery can exacerbate the “second hit” of physiological insult in an unstable patient, DCO prioritizes life over limb. Initial, rapid external fixation of major fractures provides temporary stability, controls bleeding, and allows for resuscitation and stabilization in the intensive care unit [10].

The management of intra-articular fractures, such as those of the tibial plateau or distal radius, highlights the synergy between surgical precision and rehabilitation. Anatomical reduction and stable fixation of the joint surface are imperative to prevent post-traumatic arthritis. This surgical accuracy directly enables early continuous passive motion (CPM) or active-assisted motion, which is critical for nourishing articular cartilage, preventing joint stiffness, and reducing adhesion formation [11]. The surgeon’s technical success lays the groundwork for the physiotherapist’s ability to restore function.

Patient care, delivered by nurses, advanced practice providers, psychologists, dietitians, and social workers, forms the sustaining environment that wraps around the patient throughout their journey. This domain addresses the biopsychosocial model of health, ensuring that the patient is physically, emotionally, and socially prepared to engage in and benefit from rehabilitation.

Uncontrolled pain is the single greatest barrier to effective rehabilitation. A multimodal analgesia regimen, developed collaboratively by physicians, pharmacists, and nurses, combines medications (e.g., acetaminophen, NSAIDs, opioids, neuropathic agents) with non-pharmacological strategies (ice, elevation, transcutaneous electrical nerve stimulation) to manage pain while minimizing sedating side effects [12]. Proactive nursing care is also vital in preventing common complications that derail recovery. Vigilant monitoring for signs of infection, compartment syndrome, or venous thromboembolism, coupled with protocols for prophylactic anticoagulation, incentive spirometry, and pressure ulcer prevention, maintains the patient’s physiological reserve for therapy [13]. Trauma induces a hypermetabolic,

catabolic state that can lead to profound muscle wasting and impaired immune function. Early involvement of a dietitian is essential. Protein and calorie requirements can increase by 50-100% post-injury. Adequate intake of protein, amino acids (like arginine and glutamine), vitamins C and D, and zinc is crucial for collagen synthesis, bone healing, and preserving lean body mass [14]. Nutritional support, whether via oral, enteral, or parenteral routes, must be viewed as a primary therapeutic intervention, not ancillary support.

The psychological impact of trauma is profound, with high incidences of acute stress disorder, depression, anxiety, and post-traumatic stress disorder (PTSD) [15]. Early screening by clinical psychologists or trained nurses allows for timely intervention with counseling, cognitive-behavioral therapy, or medication. Furthermore, patient education and empowerment are central to holistic care. Nurses and therapists who explain the rationale behind treatments, set realistic goals, and involve patients in decision-making foster a sense of autonomy and self-efficacy, which are powerful predictors of rehabilitation adherence and outcome [16]. Social work involvement addresses practical barriers like insurance, housing modifications, and family support, ensuring the discharge plan is safe and viable.

Physiotherapy is the active engine that translates anatomical stability into functional recovery. Its interventions are grounded in exercise science and neurophysiology and must be meticulously timed and progressed in harmony with the biological stages of healing and surgical constraints.

4. The Immediate Post-Injury and Post-Operative Phase:

Rehabilitation begins immediately. Even in the intensive care unit, for the ventilated polytrauma patient, physiotherapists perform respiratory therapy to prevent pneumonia and passive range-of-motion exercises to maintain joint mobility and prevent contractures [17]. Following orthopedic surgery, the prescription is precise: which joints can move, the allowed range, and the weight-bearing status. Early protected mobilization, such as ankle pumps and quadriceps sets after knee surgery, reduces edema, improves circulation, and counters muscle inhibition. This phase focuses on controlling pain and inflammation while preserving the integrity of the surgical repair.

As tissues heal and stability is confirmed, therapy intensifies. The focus shifts to restoring strength, proprioception, and neuromuscular control. Progressive resistive exercises, closed kinetic chain activities (like mini-squats), and balance training

are systematically introduced [18]. For lower limb injuries, gait re-education progresses from toe-touch weight-bearing to full weight-bearing, often using biofeedback and mirror therapy to correct compensatory patterns. This phase requires constant communication between therapist and surgeon to ensure progression aligns with radiographic and clinical signs of healing.

The final phase prepares the patient for a return to their pre-injury roles, whether that is walking community distances, performing manual labor, or returning to sport. Training becomes increasingly functional and task-specific. This may involve plyometrics, agility drills, sport-specific simulations, and work hardening programs [19]. The physiotherapist conducts performance tests (e.g., hop tests, strength asymmetry measures) to objectively determine readiness for full activity. This phase also includes education on long-term self-management and injury prevention strategies.

5. Mechanisms of Synergy:

The bedrock of integration is structured communication. Daily or weekly interdisciplinary rounds involving EMS (for case review), surgeons, hospitalists, nurses, physiotherapists, and case managers ensure all team members share a unified vision. Together, they establish short- and long-term goals for the patient (e.g., “transfer independently by post-op day 3,” “discharge home with a cane by day 7”). These rounds allow for real-time problem-solving—the therapist can report a mobility barrier, leading the nurse to adjust the analgesia schedule or the surgeon to clarify a weight-bearing order [20].

Evidence-based clinical pathways for specific injuries (e.g., hip fracture, tibial nail) standardize the journey from admission to discharge. These protocols delineate the expected timeline and responsibilities for each discipline, reducing variation and ensuring key rehabilitation milestones are not missed. For instance, a hip fracture pathway may mandate surgery within 36 hours, physiotherapy assessment on post-op day 1, and occupational therapy home assessment by day 3 [21]. This creates a predictable, efficient flow of care.

A dedicated case manager or rehabilitation coordinator acts as the central navigator for the patient and the glue binding the team together. This professional tracks progress against the pathway, facilitates communication between specialists, organizes family meetings, and coordinates the complex discharge planning process, ensuring timely access to outpatient therapy or inpatient

rehabilitation facilities [22]. They are the human embodiment of the continuum.

A synergistic system measures what matters to the patient. Moving beyond purely clinical metrics (e.g., time to union), integrated teams track functional outcomes using validated tools like the Patient-Specific Functional Scale (PSFS), the Lower Extremity Functional Scale (LEFS), or return-to-work rates [23]. Collecting and reviewing this data as a team fosters a culture of continuous quality improvement, where each discipline can see the impact of their collaborative work on the patient’s ultimate quality of life.

6. Addressing Specific Trauma Populations:

The elderly patient with a hip fracture is the archetype for whom system failure is catastrophic. Their care demands hyper-integration. EMS must assess for medical comorbidities. Orthogeriatric co-management, where geriatricians and surgeons collaborate from admission, optimizes medical status and prevents delirium [24]. Patient care focuses on preventing pressure ulcers and malnutrition. Physiotherapy begins on post-op day 1 with a focus on early upright mobility to prevent deconditioning. Discharge planning starts at admission. This model has been shown to reduce mortality, increase the likelihood of returning home, and improve functional outcomes [25].

The polytrauma patient requires parallel processing. While surgeons perform damage control procedures, intensivists and nurses manage resuscitation. Early physiotherapy in the ICU fights immobility. As the patient stabilizes, orthopedic reconstruction is timed with weaning from ventilation. Psychologists address trauma-related distress early. The coordination between surgical specialties, ICU, and rehabilitation medicine is exceptionally complex and hinges on a pre-established, protocol-driven team approach [26].

For injuries like anterior cruciate ligament (ACL) tears, integration begins pre-operatively. Physiotherapists deliver “pre-hab” to reduce swelling and restore full range of motion, which improves post-surgical outcomes [27]. The surgeon selects a graft and fixation technique compatible with an accelerated rehab protocol. The physiotherapist and athletic trainer then guide the athlete through phased return-to-sport testing, with clear communication back to the surgeon regarding readiness for full clearance.

7. Challenges and Future Directions

Despite its proven benefits, implementing a fully synergistic model faces significant hurdles. These

include entrenched professional silos, financial reimbursement models that favor procedural volume over coordinated care, limitations in cross-disciplinary education, and resource constraints, particularly in low- and middle-income settings [28].

Future directions must focus on system-level enablers. The adoption of shared electronic health records with interdisciplinary notes and goal-tracking functions can enhance communication [29]. Payment reform towards bundled care for episodic trauma (e.g., a single payment for the 90-day hip fracture episode) incentivizes efficiency and coordination across settings [30]. Embedding interprofessional education into the training of all healthcare professionals will cultivate the collaborative mindset from the outset [31]. Furthermore, leveraging telehealth can extend the reach of specialist consultation and therapy supervision into rural areas and the home, bridging the gap between hospital and community [32]. Research must continue to refine predictive analytics to identify patients at risk of poor outcomes and to personalize rehabilitation pathways [33].

8. Conclusion:

Trauma rehabilitation is a marathon, not a sprint, and its success depends on a well-coordinated relay team rather than a series of individual runners. The synergistic integration of Emergency Medical Services, orthopedic treatment, holistic patient care, and physiotherapy represents the gold standard for effective trauma rehabilitation. This model ensures that the lifesaving stabilization begun at the scene is seamlessly connected to the anatomical restoration achieved in the operating room, which is in turn supported by the nurturing environment of comprehensive patient care and actively translated into functional recovery through targeted physiotherapy. By breaking down disciplinary barriers, establishing robust communication channels, and relentlessly focusing on patient-centered goals, healthcare systems can transform the trauma recovery journey from a fragmented ordeal into a coherent, efficient, and ultimately more humane continuum. The ultimate measure of this synergy is not merely a healed fracture, but a person restored to their chosen life roles with hope, dignity, and optimal function. The imperative for this integrated approach is clear, and its pursuit is the most promising path forward to mitigate the enduring burden of traumatic injury on individuals and societies worldwide.

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References

- [1] Bishop A, Ogollah RO, Jowett S, Kigozi J, Tooth S, Protheroe J, et al. STEMS pilot trial: a pilot cluster randomised controlled trial to investigate the addition of patient direct access to physiotherapy to usual GP-led primary care for adults with musculoskeletal pain. *BMJ Open*. 2017;7(3):e012987.
- [2] Fairbank JC, Pynsent PB. The Oswestry disability index. *Spine (Phila Pa 1976)* 2000;25(22):2940–2952.
- [3] Gagnon R, et al. Direct-access physiotherapy to help manage patients with musculoskeletal disorders in an emergency department: results of a randomized controlled trial. *Acad Emerg Med*. 2021;28(8):848–58.
- [4] Carballeira Y, Dumont P, Borgacci S, Rentsch D, de Tonnac N, Archinard M, et al. Criterion validity of the French version of patient health questionnaire (PHQ) in a hospital department of internal medicine. *Psychol Psychother*. 2007;80(Pt 1):69–77.
- [5] Canadian Physiotherapy Association . The value of physiotherapy: musculoskeletal conditions. 2012.
- [6] Lau PM, Chow DH, Pope MH. Early physiotherapy intervention in an accident and emergency department reduces pain and improves satisfaction for patients with acute low back pain: a randomised trial. *Aust J Physiother*. 2008;54(4):243–249.
- [7] Kaplan AL, Agarwal N, Setlur NP, Tan HJ, Niedzwiecki D, McLaughlin N, et al. Measuring the cost of care in benign prostatic hyperplasia using time-driven activity-based costing (TDABC) *Healthcare (Amst)* 2015;3(1):43–48.
- [8] Roy JS, MacDermid JC, Woodhouse LJ. Measuring shoulder function: a systematic review of four questionnaires. *Arthritis Rheum*. 2009;61(5):623–632.

- [9] Frogner BK, Harwood K, Andrilla CHA, Schwartz M, Pines JM. Physical therapy as the first point of care to treat low back pain: an instrumental variables approach to estimate impact on opioid prescription, health care utilization, and costs. *Health Serv Res.* 2018;53(6):4629–4646.
- [10] Coyte PC, Asche CV, Croxford R, Chan B. The economic cost of musculoskeletal disorders in Canada. *Arthritis Care Res.* 1998;11(5):315–325.
- [11] Etges APBDS, Polanczyk CA, Urman RD. A standardized framework to evaluate the quality of studies using TDABC in healthcare: the TDABC in healthcare consortium consensus statement. *BMC Health Serv Res.* 2020;20(1):1107.
- [12] Urwin M, Symmons D, Allison T, Brammah T, Busby H, Roxby M, et al. Estimating the burden of musculoskeletal disorders in the community: the comparative prevalence of symptoms at different anatomical sites, and the relation to social deprivation. *Ann Rheum Dis.* 1998;57(11):649–655.
- [13] Glazier RH, Dalby DM, Badley EM, Hawker GA, Bell MJ, Buchbinder R. Determinants of physician confidence in the primary care management of musculoskeletal disorders. *J Rheumatol.* 1996;23(2):351–356.
- [14] Binkley JM, Stratford PW, Lott SA, Riddle DL. The lower extremity functional scale (LEFS): scale development, measurement properties, and clinical application. North American Orthopaedic rehabilitation research network. *Phys Ther.* 1999;79(4):371–383.
- [15] Gelhorn HL, Eremenco S, Skalicky AM, Balantac Z, Cimms T, Halling K, et al. Content validity and ePRO usability of the BPI-sf and “worst pain” item with pleural and peritoneal mesothelioma. *J Patient Rep Outcomes.* 2017;2(1):16.
- [16] Moffatt F, Goodwin R, Hendrick P. Physiotherapy-as-first-point-of-contact-service for patients with musculoskeletal complaints: understanding the challenges of implementation. *Prim Health Care Res Dev.* 2018;19(2):121–130.
- [17] Guengerich MB, Kim; Cotton, Susan; Mancuso, Sam. Emergency department primary contact physiotherapists improve patient flow for musculoskeletal patients. *Int J Ther Rehabil.* 2013;20(8):396–402.
- [18] Salois, R., Commissaire à la santé et au bien-être. Apprendre des meilleurs: Étude comparative des urgences du Québec. Gouvernement du Québec; 2016. http://collections.banq.qc.ca/ark:/52327/bs26_23745. Accessed 29 Nov 2020.
- [19] United States Bone and Joint Initiative: The burden of musculoskeletal diseases in the United States (BMUS). 2014. <https://www.boneandjointburden.org>. Accessed 29 Nov 2020.
- [20] Keller S, Bann CM, Dodd SL, Schein J, Mendoza TR, Cleeland CS. Validity of the brief pain inventory for use in documenting the outcomes of patients with noncancer pain. *Clin J Pain.* 2004;20(5):309–318.
- [21] Institute of Musculoskeletal Health and Arthritis . Strategic plan 2014–2018: enhancing musculoskeletal, skin and oral health. Canada: Canadian Institutes of Health Research; 2014.
- [22] McClellan CM, Cramp F, Powell J, Bengert JR. Extended scope physiotherapists in the emergency department: a literature review. *Phys Ther Rev.* 2010;15(2):106–111.
- [23] Bird S, Thompson C, Williams KE. Primary contact physiotherapy services reduce waiting and treatment times for patients presenting with musculoskeletal conditions in Australian emergency departments: an observational study. *Aust J Phys.* 2016;62(4):209–214.
- [24] Childs JD, Whitman JM, Sizer PS, Pugia ML, Flynn TW, Delitto A. A description of physical therapists’ knowledge in managing musculoskeletal conditions. *BMC Musculoskelet Disord.* 2005;6:32.
- [25] Kennedy DM, Robarts S, Woodhouse L. Patients are satisfied with advanced practice physiotherapists in a role traditionally performed by orthopaedic surgeons. *Physiother Can.* 2010;62(4):298–305.
- [26] Canadian Institute for Health Information . How Canada compares: results from the commonwealth fund’s 2016 international health policy survey of adults in 11 countries - accessible report. 2017.
- [27] Mulhern B, O’Gorman H, Rotherham N, Brazier J. Comparing the measurement equivalence of EQ-5D-5L across different modes of administration. *Health Qual Life Outcomes.* 2015;13:191.
- [28] Matifat E, Perreault K, Roy JS, Aiken A, Gagnon E, Mequignon M, et al. Concordance between physiotherapists and physicians for care of patients with musculoskeletal disorders presenting to the emergency department. *BMC Emerg Med.* 2019;19(1):67.
- [29] Lowe B, Grafe K, Zipfel S, Witte S, Loerch B, Herzog W. Diagnosing ICD-10 depressive episodes: superior criterion validity of the patient health questionnaire. *Psychother Psychosom.* 2004;73(6):386–390.
- [30] Bhattacharya A. Costs of occupational musculoskeletal disorders (MSDs) in the United States. *Int J Ind Ergon.* 2014;44:448–454.
- [31] Taylor N, Norman E, Roddy L, Tang C, Pagram A, Hearn K. Primary contact physiotherapy in emergency departments can reduce length of stay for patients with peripheral musculoskeletal injuries compared to secondary contact physiotherapy: a prospective non-randomised controlled trial. *Physiotherapy.* 2011;97(2):107–14.
- [32] Bombardier C, Hawker G, Mosher D. The impact of arthritis in Canada: today and over the next 30 years. The Arthritis Alliance of Canada. 2011. Available from: <http://www.arthritisalliance.ca/en/initiatives/impact-of-arthritis>. Accessed 29 Nov 2020.
- [33] Rene F, Casimiro L, Tremblay M, Brosseau L, Chea P, Letourneau L, et al. In process citation. *Physiother Can.* 2011;63(2):249–255.