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Impacts of Exercise on Functional Ability of Recovering GBS Patients: An Integrative Literature Review

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Impacts of Exercise on Functional Ability of Recovering GBS Patients:

An Integrative Literature Review

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Impacts of Exercise on GBS Mobility and Recovery

Background & Significance

Guillain-Barré Syndrome (GBS) is an inflammatory autoimmune polyneuropathy that causes demyelination of the peripheral autonomic nerves and nerve roots. It has an acute and chronic form termed acute inflammatory demyelinating polyneuropathy (AIDP) and chronic inflammatory demyelinating polyradiculoneuropathy (CIDP). AIDP progresses within hours, while CIDP can progress over several months. Both forms are identical in clinical manifestations, which include neuromuscular paralysis combined with sensory and motor loss beginning with peripheral extremities and progressing in a distal to proximal fashion. If left untreated or if treatment is prolonged, neuromuscular paralysis can result in respiratory depression, requiring mechanical ventilation, or death. According to the United States Centers for Disease Control and Prevention (CDC), GBS is rare with a prevalence of 3,000 to 6,000 people per year and approximately one to two cases out of every 100,000 people (CDC, 2010).

Presentation of GBS symptoms vary in severity, timing, and functional relapses. Primary symptoms include progressive numbness, tingling, muscle weakness, and extremity pain. These manifestations lead to disturbances in ability to walk, gait, speed, dexterity, coordination and can cause the patient to experience activity limitations and increased levels of fatigue impacting their overall quality of life (QoL) and inhibiting their ability to perform routine activities of daily living (ADL's) independently. Physical impairments can also lead to disruptions in both psychological and social functions of patients.

It has been determined and widely accepted that treatment for GBS, both in its AIDP and CIDP forms, can be successful with a combined pharmacological approach of intravenous or subcutaneous immunoglobulin treatment, corticosteroids, and plasmapheresis. However, beyond

pharmacological treatment options, it is critical that treatment be approached collaboratively among multiple disciplines, as patients commonly have long-term residual symptoms that can regress, resulting in continued limitation on ability to participate in activities and complete ADL's independently. Disciplines for specialty care involved in the treatment plan for GBS include neurology, physical therapy, occupational therapy, respiratory therapy, and speech pathology. Due to the impact demyelination of peripheral nerves has on the body and the immune mediated role in the body's recovery, it is unclear if exercise can be therapeutic in the recovery of GBS patients and what effects it has on the patient's level of activity, ability to perform ADL's, and their overall QoL.

Purpose

It is widely understood that exercise can have a multitude of benefits to general physical fitness, health conditions, well-being, and decreased feelings of fatigue. The purpose of this integrative literature review was to investigate the role supplemental exercise has on the disease process of GBS, CIDP, and AIDP. Further understanding of the impact exercise has on disease progression can identify if exercise can act as an adjunctive form of treatment for these immune-mediated neuropathies. Identifications were also made to include the impact exercise has on muscle strength, fatigue, walking ability, ability to perform ADL's, and overall QoL for GBS, CIDP, and AIDP patient treatment.

Research Question

1. What impacts does exercise have on functional ability of GBS patients in recovery?

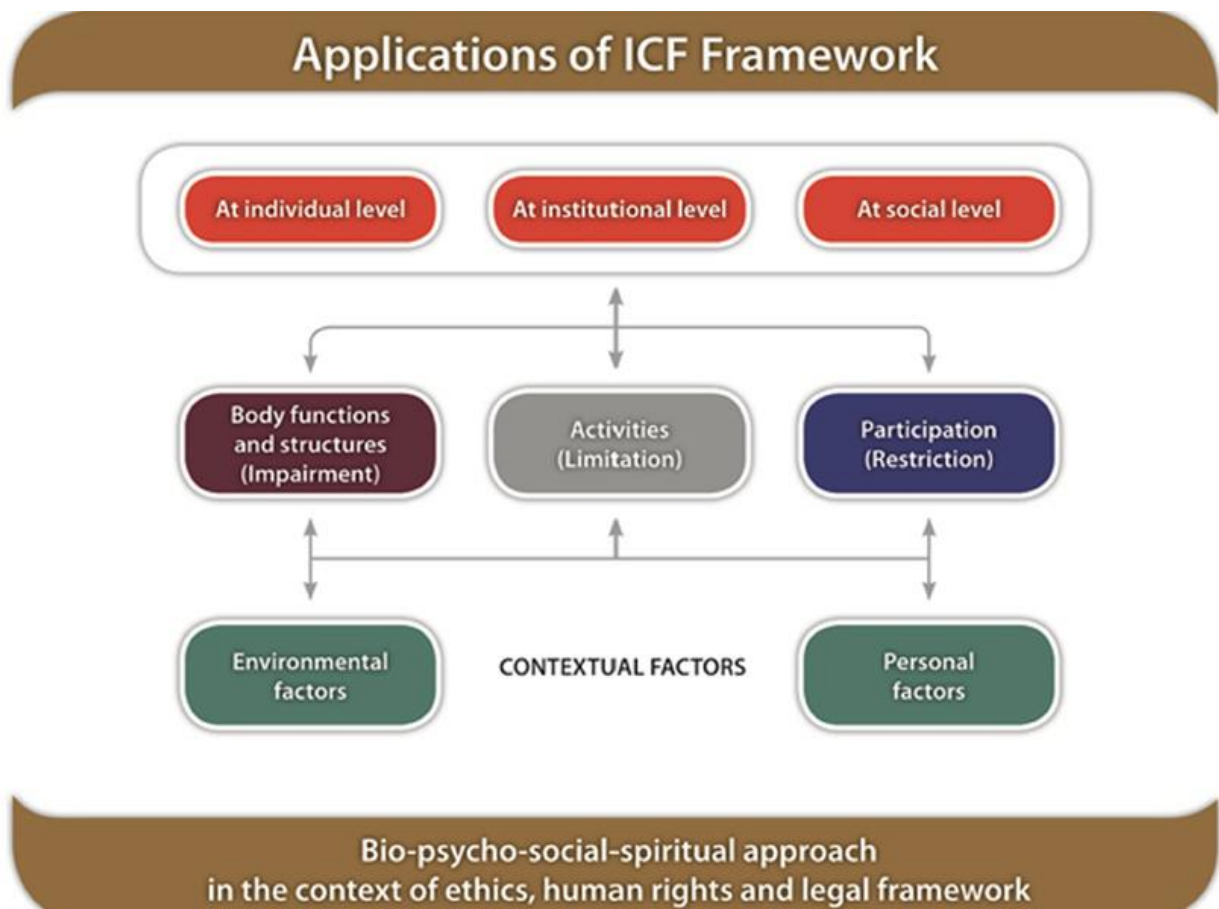
Conceptual Framework

The conceptual framework used for this integrative literature review was the International Classification of Functioning - Disability and Health (ICF-DH) operationalized by the World Health Organization (WHO). The ICF-DH was approved and endorsed by the WHO Assembly in May of 2001. It is the international standard to describe and measure health & disability and allows for demonstration of a modern understanding of how these two concepts impact the functional ability of an individual at any given moment. The ICF-DH framework, is a concept that is structured around the multitude of factors that contribute to the progressive improvement in patient livelihood, given their health condition or disease. The concept model takes multiple variables into consideration when applying it into patient care planning and determining patient recovery. Variables include the health of the individual, the disease's impact on structure and functions of the body, patient's ability to participate given the impacts of the disease, activities the patient is able or wanting to engage in, as well as environmental and personal factors of the individual, the institution implementing care, and the social implications of each variable. GBS is already approached with a multidisciplinary treatment team, making this conceptual framework relevant to the research question as it allows for examination of ability to perform activities, restrictions on participation, and psychosocial implications for the recovering individual.

The disease variable was pertinent to the conceptual framework and the integrative review, as this rare disease has a spontaneous and debilitating physiological effect on the body. The demyelination of peripheral nerves leads to a progressive inability of neuromuscular messaging to occur, resulting in the inability to participate in everyday activities despite level of fitness or health prior to the disease. Muscle strength, walking ability, fatigue, ability to perform ADL's, and psychological mood are factors related to the activity limitations and participation

restriction concepts of the framework. In both GBS forms, the sudden loss can have an emotionally driven negative impact on the patient that can be prolonged dependent on the level of recovery, experiences of symptom regressions, and the level of guidance by the institution, providers, and patient support systems. Each impact speaks to the validity in the framework’s consideration of environmental and personal detriments of the disease process, its impact on overall QoL and patient’s perceptions surrounding recovery.

Figure 1. Application of ICF Framework



Methods

Research Design

The design used to analyze the research question was an integrative literature review. It was conducted to analyze and determine what current literature has concluded regarding GBS, AIDP, and CIDP in conjunction with an exercise regimen to improve overall patient QoL and ability to perform ADL's independently. Additionally, previous reviews were completed based on research that was more than ten years old, further prompting a need to investigate what new research and literature conclusions can be made from studies within the last five years.

Literature Search Strategies

An electronic search of the literature was conducted using research databases including: Cumulative Index to Nursing and Health Literature (CINAHL), PubMed, Academic Search Complete (ASC), and Cochrane Library. The electronic search was completed from October 1st through the 12th, of 2018. Text search combinations included the following key words: *exercise, neuromuscular, disorder, disease, demyelinating, Guillain, barre, quality of life, and daily living.*

Limitations, Inclusion, and Exclusion Criteria

Inclusion criteria were peer-reviewed source articles generated over the last five years. Articles must have been available in English, and be of the nursing, medicine, or kinesiology disciplines.

Exclusion criteria included articles that discussed other polyneuropathies, neurodegenerative, or demyelinating disorders that were not GBS, AIDP, or CIDP. Articles were excluded if they were secondary sources, and if they evaluated exercise efficacy in terms unrelated to quality of life or activities of daily living.

Diagram of Review Process & Study Selection

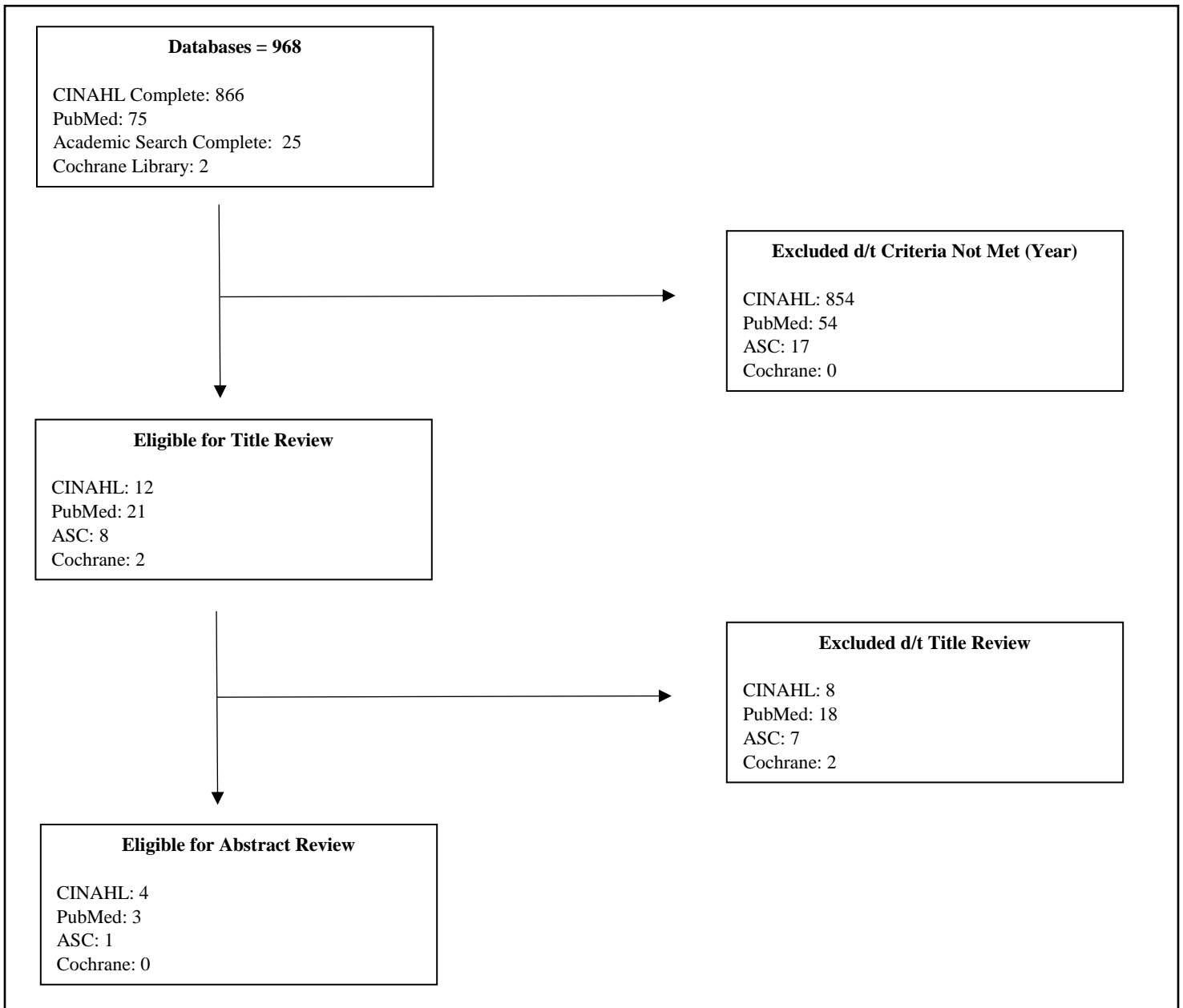


Table 1. Summary of Selected Studies

Author/Year	Title	Methods	Intervention	Variables	Measures	Participants	Control
Janssen, Bunce, Nixon, Dunbar, Jones, Benstead, Jeanes, Selfe, & Richards, 2018	A clinical case series investigating the effectiveness of an exercise intervention in chronic inflammatory demyelinating polyneuropathy	Case study	6 wk program (walking, strength, balance) assessed 10 times, 3 times prior, during, & post, once after 3mo	Gait Balance, walking speed, fatigue, QoL	Berg Balance Scale, 10MWT, FSS, EQ5D-5L, ONLS assessment	7 (on stable IVIG 3mo.)	
Markvardsen, Overgaard, Heje, Sindrup, Christiansen, Vissing, & Andersen, 2017	Resistance training and aerobic training improve strength and aerobic capacity in chronic inflammatory demyelinating polyneuropathy	Controlled trial	12 wks of aerobic exercise (ergometer bike 3x/wk) and 12 wks of resistance exercise (unilateral training of knee, elbow flexion/extension), after a period of 12 wks without exercise	Level of disability, QoL, fatigue, muscle strength, aerobic capacity	ODSS, SF-36, EQ5D-5L	18 (SQ IG)	
Novak, Smid, & Vidmar, 2017	Rehabilitation of Guillain-Barre syndrome patients: An observational study	Observational study	comprehensive rehabilitation	Muscle strength, functional independence, walking speed & gait, QoL	MRC-SMS, FIM, ICF-D&H Categorization, 6MWT, 10MWT	45 (20 f/25m)	
Draak, Pruppers, Nes, Vanhoutte, Bakkers, Gorson, Van der Pool, Lewis, Notermans, Nobile-Orazio, Leger, Van den Bergh, Lauria, Bril, Katzberg, Lunn, Pouget, Van der Kooi, Van den Berg, Doorn, Cornblath, Hahn, Faber, & Merkies, 2015	Grip strength comparison in immune-mediated neuropathies: Vigorimeter vs. Jamar	Cross-sectional Longitudinal	Jamar dynamometer Vigorimeter	Grip strength	Post-intervention surveys, assessment of strengths with Jamar dynamometer & Vigorimeter	Cross sectional (102 - 60GBS/CIDP) Longitudinal (163 - 114GBS/CIDP)	
Ko, Ha, & Kang, 2017	Effects of daily living occupational therapy and resistance exercise on the activities of daily living and muscular fitness in Guillain-Barre syndrome: A case study	Case study	daily living OT and resistance exercise (2x/wk for 70min/session for 12wks)	Performance of ADL's & muscular fitness	Barthel Index, Biodex System, muscular fitness via isokinetic muscular function	1	
White, Hadden, Robert-Lewis, McCrone, & Petty, 2015	Observer blind randomised controlled trial of a tailored home exercise programme versus usual care in people with stable inflammatory immune mediated neuropathy	Observer blind, randomised controlled trial	12 wk tailored home exercise program vs. advice & usual care	Activity limitation, psychological well-being, functional health & wellness, level of physical activity, health beliefs, and self-efficacy	RODS, ONLS, HADS, SF-12, IPAQ-short, Brief IPQ, and RFSS	70	
Mohammad, Toopchizadeh, Vahideh, Maher, Sadeghi, Paria, Fatemh, Pishgahi, & Alireza, 2017	Predictive factors for achieving independent walking in children with Guillain-Barre syndrome	Prospective, observational study				324	
Kreutzfeldt, Jensen, Ravnborg, Markvardsen, Andersen, & Sindrup, 2017	The six-spot-step-test- A new method for monitoring walking ability in patients with chronic inflammatory polyneuropathy				SSST - lower extremity function T25FW - lower extremity function	62	61

Research Findings

Results

Research studies and published article findings correlating directly to the primary impacts of exercise as well as several secondary impacts on the patient, pertinent to the ICF-DH conceptual framework were outlined based on the central themes listed below.

Muscular strength and fitness

While regimens differed, aerobic and resistance exercise programs for treatment of GBS patients indicated overall improvements in muscular strength and fitness, with some studies indicating improvements that were statistically significant. Patients compliant with a combination of resistance & aerobic training programs for 12-weeks resulted in improvements in knee, elbow, shoulder, and lumbar flexion & extension strengths. Improvements were indicated based on the gradual increases in total weight load recovering patients were able to perform week-to-week. In addition, one study was able to control results indicating improvements by having the initially weaker side of the patient be the single side enduring the regimen. This allowed for clear evidence that improvements were made to specific muscle groups despite pathological damage caused to the demyelinated peripheral nerves.

Activities of daily living, functional independence, & overall disability

Functional independence and overall disability have an impact on the ability of a patient to complete activities of daily living. These variables correlate to the limitations of activities and restrictions to participation in the ICF-DH application framework. Functional independence was assessed using functional independence measure (FIM) scores. Activity limitations, overall disability, and ability to complete ADL's were assessed via the modified Barthel Index, Overall

Neuropathy Limitations Scale (ONLS), Rasch-built Overall Disability Scale (RODS), and the International Physical Activity Questionnaire-Short Form (IPAQ-short) results.

Results for studies that examined the effects of a daily occupational therapy exercise regimen, a tailored home-exercise program, and implementation of a rehabilitation program into the treatment plan for GBS recovery indicated statistically significant improvements.

Improvements were noted in overall FIM scores, increased ability to complete specific ADL tasks, shortened length of time to complete ADL's, decreases in activity limitations and overall disability scores. Patient compliance was ensured by a variation of confirmations including direct monitoring, home visits, phone calls, interviews, and self-reported IPAQ-short forms. One study concluded improvements to participants at 4-week, 8-week, and 12-week intervals. After three months of continued participation in a supplemental exercise regimen, patient rehabilitation reached a functional plateau where little to no further improvement was expected nor noted within the study.

Walking speed and balance

Walking speed and balance was assessed throughout an observational study and a clinical case series via the Berg Balance Scale and monitoring & timing of patient performance of either a 6-meter walking test (6MWT) or a 10-meter walking test (10MWT). Overall trends indicated improvements in balance and walking speeds when comparing pre-interventional results to post-interventional results. Additional improvements were noted as patients whom began the study requiring aid from walkers and canes to complete assessments were later able to complete each test without the aid of any assistive devices post-implementation of exercise as an intervention.

Fatigue

Fatigue can be difficult to accurately assess and measure, as it is a secondary patient subjective symptom. Across three studies, different assessments and questionnaires were examined to identify any correlation to post-intervention results of patient-reported levels of fatigue. The Fatigue Severity Scale (FSS), 36-item short form health survey questionnaire (SF-36), and the Rasch-modified fatigue severity scale (RFSS) were used respectively. Each study noted no statistically significant changes in fatigue based on scale and questionnaire results.

Quality of life

Quality of life is another measure that is difficult to formally assess, and results are solely dependent upon patient's subjective responses. Three studies assessed for changes to overall QoL via the five-level Euro-QoL 5D (EQ5D-5L) instrument and the inadvertent results of the SF-36 survey and FIM scores. One study concluded that "an FIM gain of 19 points indicated that on average, the patients' need for help had been reduced for one entire day. This may bring a better quality of life to the patients and their relatives" (Novak, Smid, & Vidmar, 2017).

Discussion

After examination of several peer-reviewed articles discussing studies and comparing trials and regimens it can be concluded that implementation of any form or combination of aerobic and resistance training has a positive impact on the physical aspects of recovery from GBS, AIDP, and CIDP. While some studies found no statistical significance, within each study, there were no indications that an exercise regimen caused the patient's clinical manifestations to resurface or regress in any capacity. Findings that resulted in statistical significance did require a combination of aerobic and resistance exercises or a specific regimen to be followed by GBS

recovering participants. Returning to the ICF-DH application framework, interventions required participation at the individual level and at the request and supervision of the institution or medical personnel prescribing the treatment plan. Additionally, implementing exercise as an intervention within the plan of care was shown to increase patient body function despite disease progression, decrease limitations on activities, increase participation by reducing patient restrictions, with deliberate effects on the patient's ability to regain their social constructs and need for continuous care once symptoms have resolved. Results indicated patients were able to regain strength in previously weakened extremities, experienced increased speed of mobility, balance, and reductions in gait abnormalities. Secondary conclusions can be made correlating the primary effects of the exercise intervention regimens, indicating increased ability to perform ADL's independently, increased confidence in performing activities, and increased overall QoL for recovering patients. Applying these conclusions to the ICF-DH framework, findings indicated impactful results to both environmental and personal factors required for sustaining an increased QoL for patients can be acquired by prescribing patients a specific exercise regimen to aid in ability of patients to be mobile enough to independently complete their ADL's and ultimately can aid in their psycho-social recovery.

Limitations of Literature Review Results

Limitations on the conclusions of this literature review include a lack of exercise regimen specificity regarding the exercises performed, equipment weights, and suggested regimen lengths. Limitations also include assessment specificity and uniformity. Lastly, sample size and the widely variable onset, progression, regression, and resolution of the disease within its pathophysiology are all limitations to definitive conclusions. Further studies must be completed in a controlled setting that can account for patients with similar symptomatic losses in function,

pharmacological treatment, and degree of overall loss. Lastly, GBS is a rare disease, affecting approximately 3,000 to 6,000 people per year, resulting in a very small sample size to allow for concrete studies with valid results to be generalized across the affected population.

Implications for Registered Nursing Practice

The American Nurses Association (ANA) registered nurse code of ethics with interpretation for provision 2.3 discussing collaboration states the following: “nurses should foster collaborative planning to provide safe, high-quality, patient-centered health care. Nurses are responsible for articulating, representing, and preserving the scope of nursing practice, and the unique contributions of nursing to patient care. The relationship between nursing and other health professions also need to be clearly articulated, represented, and preserved. Nurses facilitate informed decision-making by assisting patients to secure the information they need to make choices consistent with their own values” (ANA, 2015).

The implications these results have on the nursing role are surrounded around the need to advocate for patients and to facilitate collaborative planning among the large multidisciplinary team creating the treatment plans for patients diagnosed with GBS, or any of its variations. The findings of the integrative literature review, indicated that exercise does not cause any harm to patients and restores the recovering patient’s confidence in performing tasks, improves strength and mobility. These results have the potential to inadvertently increase the patient’s self-image, ability to perform ADL’s independently, and furthermore improve their quality of life.

Registered nurses contributing to care coordination and mandating collaboration is a core competency and professional standard for the role. Having reached the conclusions found in the implementation of an exercise regimen to recovering GBS patients, nurses can now ensure that patients are not only being visited by occupational and physical therapists during their inpatient

stay but can advocate for a specific regimen to be prescribed for the patient's being discharged home. If a patient is hospitalized for a longer length of time, nurses can request for other healthcare personnel to begin meeting with patients as early as tolerable and can provide a safer environment for monitoring patient progress with the regimen. These findings should empower nurses caring for GBS patients to advocate for adjunctive exercises interventions within the treatment plan as to aid in patient's recovery and overall well-being.

Conclusions

The findings of the integrative literature review indicated that exercise has a positive impact on patient recovery from GBS. Implementing an exercise regimen improved the patient's ability to complete ADL's independently, improved their muscular strength, mobility, gait, balance, perception of the disease process, confidence, and impacted their overall quality of life.

GBS, CIDP, and AIDP manifestations of symptoms are broad and make it incredibly difficult to categorize treatment plans solely based on the disease pathophysiology alone. Therefore, should this research be continued, it is imperative that the regimen prescribed be specific to the current state of the patient or specific to the patient's progress. All participants should follow the same guidelines for accuracy in results and should be reported using the same form of assessments to maintain consistency and provide uniformity among results. In addition, controlled studies should be conducted to examine if specific regimens have varying results, and to determine whether the implementation of an exercise regimen as a form of adjunctive therapy decreases overall recovery time for GBS patients. This will allow for additional understanding of how large of a role exercise has on the recovery from the disease and can aid in the development of future treatment guidelines and recommendations.

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