PM R 8 (2016) 529-535

www.pmrjournal.org

Original Research

Functional Outcomes and Unplanned Transfers of Pediatric Patients With Central Neurological Impairments Receiving Inpatient Rehabilitation Care With Cancer and Noncancer Diagnoses

Elaine Tsao, MD, Kristie Bjornson, PT, PhD, PCS, Ana Christensen, MPH, Susan Apkon, MD

Abstract

Background: Functional impairments from central nervous system (CNS) dysfunction experienced by pediatric patients with cancer diagnoses are well documented. However, little is known of these patients' functional outcomes and potential complications while receiving inpatient rehabilitation services.
Objective: To compare functional outcomes and unplanned transfer rates of pediatric patients with impairments associated with CNS dysfunction between those with primary cancer diagnoses and noncancer diagnoses while receiving inpatient rehabilitation care.
Design: Retrospective comparison cohort study.
Setting: Inpatient rehabilitation unit within a regional tertiary care pediatric hospital.
Participants: Patients with CNS-based functional impairments with primary cancer diagnoses (n = 107) and noncancer diagnoses (n = 480), admitted to the inpatient rehabilitation unit between January 1, 2005 and April 1, 2012, who were aged 1 to 20 years at time of admission.
Intervention: Not applicable.
Main Outcome Measures: Pediatric Functional Independence Measure (WeeFIM) reflecting functional status was collected at admission and discharge with change score and WeeFIM efficiency calculated. Length of stay on the rehabilitation unit and unplanned transfer rates were also collected.
Results: No significant difference in total WeeFIM scores at admission was found between cancer and noncancer groups. Both groups had significant increases in WeeFIM scores at discharge ($P < .001$). The noncancer group had significantly higher WeeFIM change in self-care ($P = .001$), mobility ($P = .009$), and total score ($P = .004$) and had a greater length of stay ($P < .001$). A comparison of WeeFIM efficiency in all domains revealed no significant difference between cancer and noncancer groups. There was also no significant between-group difference in unplanned transfer rates.
Conclusions: Children with CNS-based functional impairments with cancer and noncancer diagnoses made functional gains with similar WeeFIM efficiencies after undergoing inpatient rehabilitation. However, patients with noncancer diagnoses made greater gains in self care, mobility, and total scores with longer stays on the rehabilitation service. No significant difference was found in unplanned transfer rates between cancer and noncancer groups for acute medical care.

Introduction

The incidence of childhood cancers is on the rise, with an estimated 15,780 new cases in 2014 for children aged 0-19 years [1]. Children with cancer have experienced improved survival with recent advances in diagnosis and treatments, but childhood cancer survivors often encounter long-term adverse consequences from their disease and medical interventions [2-18]. Although functional impairments of pediatric cancer patients and survivors are well-recognized, literature on the effects of inpatient cancer rehabilitation for children and adolescents is sparse in contrast to that for the adult population [19-28]. Little is known of the functional

1934-1482/$ - see front matter
http://dx.doi.org/10.1016/j.pmrj.2015.10.007

outcomes of pediatric patients with various oncologic diagnoses after receiving inpatient rehabilitation services. To the authors' knowledge, there are no published comparative studies investigating the functional status upon discharge from inpatient rehabilitation between children with cancer diagnoses and those with noncancer diagnoses. Furthermore, given the medical complexities that children with cancer often encounter, information on unplanned transfers off the rehabilitation unit for acute medical care would offer important insight into the potential complications that these patients may experience during their inpatient rehabilitation stay.

Numerous studies on cancer rehabilitation have focused on patients with impairments associated with dysfunction in the central nervous system (CNS) [20,23,25-29], which is reflected by the majority of diagnoses for children requiring inpatient rehabilitation at the study institution. Thus, the aim of this study was to evaluate and compare the functional outcomes of pediatric patients with CNS-related impairments between those with cancer and noncancer diagnoses. The rates of unplanned transfers from inpatient rehabilitation unit for acute medical care were also investigated.

Methods

After receiving institutional review board approval, a retrospective chart review was performed for all children and adolescents aged 1 to 20 years who were admitted to the inpatient acute rehabilitation service at a regional tertiary pediatric hospital from January 1, 2005, to April 1, 2012. Sources of chart review included electronic medical records and Uniform Data System for Medical Rehabilitation (UDSMR), which is an organization that maintains an electronic database of patient functional outcomes for a majority of rehabilitation facilities in the United States. The following information was extracted from chart review: demographic data including age, gender, and ethnicity; inpatient rehabilitation length of stay (LOS); primary diagnosis of disease or injury identified by ICD-9 codes; functional impairment that required inpatient rehabilitation admission as classified by the UDSMR impairment group codes, such as traumatic brain dysfunction, stroke, and spinal cord dysfunction; functional status at time of admission to and discharge from inpatient rehabilitation; and number of unplanned transfers off the rehabilitation service for acute medical care, as well as clinical factors leading to these transfers.

Using ICD-9 codes and chart review, patients were considered for the cancer group if they had oncologic diagnoses that resulted in admittance to inpatient rehabilitation, whereas all others were considered for the noncancer group. Next, within each group, only the patients with CNS-related functional impairments were selected as identified by the UDS_{MR} impairment group codes and chart review. CNS-related functional impairments with noncancer diagnoses included stroke, brain dysfunction, neurological conditions (eg, multiple sclerosis), spinal cord dysfunction, and major multiple trauma (ie, brain injury with spinal cord injury or polytrauma). Brain and spinal cord dysfunction comprised the central neurological impairments in patients with brain and spine tumors in the cancer group. Patients with non-CNS impairments were excluded from the study. However, those with non-CNS primary cancers but with impairments associated with disturbance in the brain or spine by disease progression or cancer treatment were included in the cancer group. Examples of processes affecting the CNS included metastasis, hemorrhagic stroke, and methotrexate leukoencephalopathy.

Functional status on admission to the inpatient rehabilitation service and upon discharge was measured by the WeeFIM instrument, which was used to assess a child's need for assistance with the items within domains of self-care (eating, grooming, bathing, upper body dressing, lower body dressing, toileting, bladder management, and bowel management), mobility (chair/wheelchair transfer, toilet transfer, tub/shower transfer, mobility with walking, wheelchair, or crawling, and stairs), and cognition (comprehension, expression, social interaction, problem solving, and memory). Each item is rated on a 7-point scale, with 1 indicating a requirement for total assistance and 7 indicating complete independence in performance of the task. WeeFIM efficiency was calculated by subtracting the total WeeFIM score on admission from the score at discharge, which is then divided by LOS. Independent-samples *t*-tests were conducted to evaluate differences between age, WeeFIM scores, and LOS. In addition, χ^2 analyses were used to compare race/ethnicity, gender, and transfer rates between the 2 groups.

Data from each admission were analyzed separately from subsequent admissions for patients with more than 1 inpatient rehabilitation stay if the patients had new functional impairments that required additional inpatient rehabilitation care. For those who had scheduled or unplanned transfers off the inpatient rehabilitation service but later returned to continue their rehabilitation with the same set of functional impairments and goals, the rehabilitation course in its entirety was then considered as 1 admission.

Results

Within the study period, there were a total of 775 admissions to the inpatient rehabilitation unit, 765 of which met the inclusion criteria. Nine admissions were excluded from the study because of the patients' age falling outside the study criteria at the time of admission, and 1 admission was excluded because of incomplete WeeFIM records. Of the patients who met