RESEARCH ARTICLE

Connecting Hospital to Home: Characteristics of and Rehospitalization Rates in Hospitalized Children With Private-Duty Nursing

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ABSTRACT

OBJECTIVES: Children with medical complexity are frequently hospitalized and have extensive health care needs. Private-duty nursing (PDN) is a service on which some children with medical complexity rely to live at home, but little is known about patients discharged with PDN. Our objective for this study was to describe the characteristics and longitudinal outcomes of patients with PDN who are hospitalized.

METHODS: This study was a 1-year retrospective study of patients receiving PDN who were hospitalized at a quaternary freestanding children's hospital; there was an additional 2-year follow-up. Patient characteristics, rehospitalization rates, length of stay, mortality, and hospital charges were identified. Descriptive statistics were performed to characterize trends, and a time-to-event analysis was used to characterize unplanned rehospitalization.

RESULTS: Among 8187 unique patients who were hospitalized in the initial study year (June 1, 2014 to –May 31, 2015), 188 patients (2%) used PDN. Of patients using PDN, 94% used gastrointestinal devices. The median index length of stay was 4 days (interquartile range 2–6). Two-year mortality was 12%. Cumulative all-cause rehospitalization rates were 18% by 30 days, 62% by 365 days, and 87% within 2 years; the median rehospitalization frequency was 3 per patient. The most common reasons for unplanned rehospitalization were infection (41%) and device complication (10%). During the study period, 11% of both rehospitalizations and total hospital days were attributed to patients with PDN. Unplanned rehospitalizations of patients with PDN accounted for $117 million in hospital charges.

CONCLUSIONS: One in 50 patients hospitalized at a single center were discharged with PDN, which accounted for a disproportionate level of hospital use. Future research should be used to address whether the access and quality of PDN may impact rehospitalization.

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Children with medical complexity (CMC) are defined as a population of pediatric patients with chronic complex conditions or fragile health often with functional impairment and sometimes with medical device dependence.[1] Only 1% to 5% of children are CMC, but CMC account for one-fourth of acute care hospitalizations and one-half of all hospital costs.[2,3] Increasingly, hospitals are working to identify how to safely transition CMC home to avoid rehospitalizations while also maximizing patient health outcomes.[4–6]

Home health care includes services and supplies that support the diagnosis or treatment of a patient's condition where he or she lives.[7,8] In a recent national study, it was estimated that 1 in 20 (5%) children are discharged with skilled care (short-term or long-term), with an estimated 500 000 children using home health care in 2000.[9,10] A core service of home health care is private-duty nursing (PDN) (also called "home nursing"), defined as a registered nurse or licensed practical nurse who provides clinical services at home for extended periods.[7] CMC often rely on PDN to help with daily medical care that was initiated or adjusted in the hospital, including medication administration, respiratory suctioning, tracheostomy care, vascular catheter maintenance, and tube feedings.

Although general context around discharge with home health care is provided in existing research, little is known about the clinical characteristics and longitudinal outcomes of children discharged with PDN. Understanding the clinical needs and hospital use patterns among children with PDN will illuminate the continuum of care for this fragile population. Therefore, our objectives for this study were to describe the clinical and health care use patterns of pediatric patients who were hospitalized and had PDN as part of their plan of care and to evaluate their longitudinal outcomes, including mortality and rehospitalization rates.

TABLE 1 Demographic Characteristics of Patients With a PDN Care Plan Admitted to a Quaternary Freestanding Children's Hospital (June 1, 2014 to May 31, 2015)

Characteristics	Patients With PDN (n = 188) n (%)	Patients Without PDN (n = 7999) n (%)
Age, y		
<1	33 (18)	1954 (24)
1–4	68 (36)	2000 (25)
5–9	33 (18)	1465 (18)
10–13	24 (13)	1091 (14)
14–17	21 (11)	1166 (15)
18–21	7 (4)	244 (3)
≥22	2 (1)	79 (1)
Sex		
Female	87 (46)	4355 (54)
Male	101 (54)	3644 (46)
Race and ethnicity		
White, non-Hispanic	60 (32)	3120 (39)
Hispanic	61 (32)	2632 (33)
African American, non-Hispanic	48 (26)	1444 (18)
Asian American	11 (6)	364 (5)
Other or unknown	8 (4)	439 (5)
Primary payer		
Public or Medicaid	119 (63)	4230 (53)
Private or commercial	67 (36)	3612 (45)
Other	2 (1)	157 (2)
Language		
English	153 (81)	6726 (84)
Spanish	32 (17)	1081 (14)
Other or unknown	3 (2)	192 (2)
Interpreter used in hospital encounters		
No	158 (84)	6910 (87)
Yes	30 (16)	1028 (13)
Unknown	0 (0)	61 (<1)
Home location		
Urban	176 (93)	7383 (92)
Rural	3 (2)	209 (3)
Unable to classify	9 (5)	407 (5)

Demographic characteristics for patients without PDN during the same time period are shown for context.

METHODS

Study Design

This was a 1-year retrospective study with a 2-year follow-up of patients admitted to and discharged from a quaternary freestanding children's hospital in the Midwestern United States. Institutional review board approval was granted for all study procedures.

Data Sources

Patient demographic and clinical data were obtained from hospital chart data; the hospital business analytics department provided charge data. Case management (CM) data were available through an integrated software system (MidasPlus, Inc, Tucson, AZ) used by hospital case managers to track CM activities. Hospital practice during the study period dictated that patients discharged with home health care be logged by using a discrete field entry plus free-text comments as needed.

Identification of Patients With PDN

Patients were identified as having a PDN plan of care through the following CM

TABLE 2 Primary Condition and Medical Device Dependence in Patients With a PDN Care Plan Admitted to a Quaternary Freestanding Children's Hospital (June 1, 2014 to May 31, 2015)

Characteristic	Patients With PDN (n = 188) n (%)
Primary condition	
Genetic	75 (40)
Genetic syndrome (eg, CHARGE syndrome, trisomy 21, etc) or genetic mutation not otherwise specified	40 (21)
Muscular dystrophy, spinal muscular atrophy, or other neurodegenerative condition	13 (7)
Metabolic or mitochondrial condition	7 (4)
Congenital central hypoventilation	6 (3)
Craniofacial syndrome	5 (3)
Skeletal dysplasia	4 (2)
Brain injury	40 (21)
Cerebral palsy	30 (16)
Other injury (eg, traumatic, infectious, autoimmune, etc)	7 (4)
Intractable epilepsy or seizure disorder (NOS)	3 (27)
Prematurity complications or sequelae (NOS)	25 (13)
Multiple congenital anomalies (NOS)	17 (9)
Intestinal failure ("short-gut syndrome")	16 (9)
Spinal cord	10 (5)
Congenital (ie, spina bifida)	6 (3)
Spinal cord injury (eg, infection, traumatic)	4 (2)
Other (eg, renal dysplasia, airway anomaly, etc)	5 (3)
Medical device used, by system	
Gastrointestinal	176 (94)
Gastrostomy tube	140 (74)
Gastrostomy-jejunostomy tube	27 (14)
Nasogastric tube	7 (4)
Ostomy	2 (1)
Respiratory	134 (71)
Invasive	118 (63)
Tracheostomy and ventilator	72 (38)
Tracheostomy (only)	46 (25)
Noninvasive (eg, BiPAP, CPAP, nasal cannula)	16 (9)
Neurology	29 (15)
Shunt (eg, ventriculoperitoneal shunt)	21 (11)
Baclofen pump	4 (2)
Vagal nerve stimulator	4 (2)
Vascular (ie, central line or port)	18 (10)
Other (cardiac pacemaker, diaphragm pacer, cochlear implant, dialysis)	10 (5)
None	2 (1)

Patients may have >1 medical device. BiPAP, bilevel positive airway pressure; CHARGE syndrome, coloboma, congenital heart disease, choanal atresia, mental and growth retardation, genital anomalies, and ear malformations and hearing loss; CPAP, continuous positive airway pressure; NOS, not otherwise specified.

discrete fields: "Nursing Agency," "Private Duty Nursing Service," and "Private Duty Nursing Update." Discrete fields related to other home health care were assessed for PDN terms (eg, PDN, home nursing, etc) for completeness. Triangulation of this identification method was conducted with a separate available registry of patients dependent on mechanical ventilation who were known to use PDN at the same institution. Lastly, patient hospital charts were reviewed to confirm a true PDN care plan (ie, short-term visiting nursing was excluded). Patients with primary psychiatric hospitalizations were excluded.

Patient and Index Hospitalization Characteristics

Patient and index hospitalization characteristics were identified by using hospital chart data, including age, sex, race and/or ethnicity, payer, language, interpreter use, diagnostic and/or procedural codes, palliative and/or hospice care involvement, which hospital unit patients were discharged from, and where patients were discharged to, defined as the disposition destination (ie, home, facility, etc). Patient zip code was used to determine if a patient lived in a rural versus urban county.[11] Chart review was used to identify the primary diagnosis and to identify medical device dependence, defined as having a device that, if it were to fail or be withdrawn, would likely cause adverse health consequences sufficient to require hospitalization.[12]

Reason for index hospitalization, defined as the first time a patient was admitted during the index period with a PDN plan of care, and reason for subsequent hospitalization (first rehospitalization) were gathered from hospital chart data. Categorization of reasons for hospitalization was discussed between coauthors (C.C.F. and M.M.D) until consensus was achieved, with device complications defined as a hospitalization directly caused by the malfunction (including infection) of a device.

Outcome Measures

Patient death, hospital charges, rehospitalization, and length of stay (LOS) for hospitalizations were examined as outcomes during the 2-year follow-up period. All-cause 7-day, 30-day, 120-day, 365-day, and 2-year rehospitalization rates after index hospitalization were calculated. Unplanned versus planned rehospitalizations were distinguished by using a previously validated method.[13] The

TABLE 3 Hospital Unit and Disposition for Index Hospitalizations

Characteristic	Patients With PDN (n = 188) n (%)	Patients Without PDN (n = 7999) n (%)	P
Hospital unit at discharge			<.001
Medical or surgical unit	92 (49)	6462 (81)	
Intensive care	96 (51)	1537 (19)	
PICU	75 (40)	355 (4)	
Cardiac ICU	15 (8)	742 (9)	
NICU	6 (3)	440 (6)	
Other	0 (0)	5 (<1)	
Disposition from index hospitalization			<.001
Home or self-care	169 (90)	7719 (96)	
Post–acute care facility	15 (8)	120 (2)	
Rehabilitation	7 (4)	83 (1)	
Intermediate or transitional care	5 (3)	24 (<1)	
Skilled nursing	3 (2)	12 (<1)	
Long-term care	0 (0)	1 (<1)	
Transfer to another acute care hospital	2 (1)	55 (<1)	
Inpatient death	2 (1)	51 (<1)	
Other	0 (0)	54 (<1)	

For hospital location at discharge, the χ^2 test was used to compare medical or surgical unit versus intensive care for patients with versus without PDN. For disposition from index hospitalization, the χ^2 test was used to compare home or self-care versus all other groups for patients with versus without PDN.

total number of unique home health care agencies and agency switches per child during the study period was counted.

Analysis

Quantitative data analysis was conducted by using SAS 9.4 (SAS Institute, Inc, Cary, NC). Descriptive analyses were performed to describe the distribution and variance of patients' clinical and use characteristics and also the distribution of patients discharged with PDN versus without PDN. χ^2 tests were performed to evaluate differences in hospital units and disposition between patients with and without PDN. P<.05 was considered statistically significant. The number of rehospitalizations in 0 to 7, 8 to 30, 31 to 120, and 121 to 365 days and within the 2-year follow-up period after index hospitalization were calculated separately for planned and unplanned rehospitalizations. Total LOS (days) and hospital charges (dollars) were also calculated. Time-to-event analysis, presented as a Kaplan–Meier curve, was used to characterize the time to unplanned rehospitalization over the 2 years after index hospitalization, with censoring for patient death or if a patient was lost to follow-up, defined as no longer receiving care in our health system.

RESULTS

Study Sample

A total of 8580 patients in the index year were identified (Fig 1) during June 1, 2014 to May 31, 2015, (index period) with the 2-year follow-up through May 31, 2015. Excluding 393 patients hospitalized for psychiatric illness, we identified 11 583 medical or surgical hospitalizations for 8187 unique patients. Of the 8187 patients not hospitalized for psychiatric illness, 1537 unique patients (19%) involved CM for a home health service or supply, as documented in 4254 CM entries. Two-thirds of patients with a home health care entry had at least 1 entry for durable medical equipment (n = 1024), and approximately one-half (55%; n = 848) had some other home health care need, such as an intravenous infusion, peripherally inserted central catheter or port, wound care, and/or feeding pump or tube care. Of patients with home health care entries, 188 (2% of unique patients who were hospitalized in the index period; 12% of patients with home health at discharge) had PDN as a part of their care plan for the index hospitalization.

Patient and Index Hospitalization Characteristics

Of the 188 patients with PDN in the index period, 15% (n = 29) were initiating PDN care for the first time, whereas the majority (85%; n = 159) were admitted with PDN already established as part of their care plan. Demographics and clinical characteristics of patients with PDN (Table 1) reveal the degree of medical complexity and the range of diagnoses involved. The majority of patients with PDN had Medicaid (63%; n = 199) as their primary payer. The mean age was 7 years (SD ± 6 years). Almost all patients discharged with PDN (99%; n = 186) had some form of device dependence. Gastrointestinal devices were most common (94%; n = 176) and were predominately related to tube feeding. Respiratory devices were the second most common type of medical devices (71%; n = 134), with 63% (n = 118) of patients dependent on the use of tracheostomy and/or mechanical ventilation. More than one-quarter (28%; n = 15) of patients with PDN had inpatient or outpatient palliative and/or hospice care documented.

Patients with PDN had a mean index LOS of 15 days (SD ± 38) and a median index LOS of 4 days (interquartile range of 2–6] and were discharged from medical units and ICUs with equivalent frequency. These use and disposition characteristics varied significantly from those of other patients hospitalized during the index period (all P < .001; Table 2). The vast majority of patients with PDN were discharged to home care or self-care after index hospitalization (90%); another 8% were discharged to a post–acute care facility. Infection was the most common primary reason for index hospitalizations (41%; n = 78; Table 3), with approximately one-third of patients admitted for respiratory infections. Approximately 10% of patients were admitted for a device-related complication.

TABLE 4 Primary Reasons for Index and Subsequent Hospitalization for Patients Hospitalized With a PDN Care Plan at Time of Index Discharge

Hospitalization Diagnosis	Index Hospitalization (n = 188) n (%)	First Subsequent Hospitalization (n = 163) n (%)
Unplanned	149 (79)	138 (85)
Infection	78 (41)	81 (49)
Respiratory	62 (33)	61 (37)
Systemic (eg, sepsis, generalized viral illness)	7 (4)	9 (6)
Gastrointestinal	3 (2)	5 (3)
Soft tissue	3 (2)	2 (1)
Urinary	2 (1)	4 (2)
Spinal	1 (<1)	0 (0)
Device complication	17 (9)	18 (11)
Central line (eg, malfunction, infection, rule-out infection)	6 (3)	6 (4)
Respiratory (eg, decannulation, ventilator malfunction)	4 (2)	1 (<1)
Gastrointestinal (eg, tube malfunction)	3 (2)	6 (4)
Neurologic (eg, shunt malfunction, infection, leak)	3 (2)	4 (2)
Other (eg, dialysis malfunction, orthopedic hardware)	1 (<1)	1 (<1)
Gastrointestinal (eg, obstruction, bleed, pancreatitis, etc)	15 (8)	15(9)
Prematurity or birth (ie, complications of, anomalies, etc)	10 (5)	0 (0)
Seizures	10 (5)	9 (6)
Noninfectious respiratory (eg, apnea, respiratory failure etc)	5 (3)	6 (4)
Social (eg, abuse, social disarray, failed discharge plan, etc)	3 (2)	0 (0)
Other (eg, fracture or dislocation, behavior, trauma etc)	11(6)	9 (6)
Planned (eg, sleep study, electrophysiology study, surgery, etc)	39 (21)	25 (15)

Primary reasons (as determined by chart review) for hospitalization, index hospitalization, and subsequent hospitalization (ie, first readmission) are shown by category.

Longitudinal Outcomes

According to hospital records, 12% (n = 22) of patients with a PDN care plan died during the 2-year follow-up. Approximately two-thirds (68%; n = 15) of those who died had documented palliative and/or hospice care. Among patients who survived the 2-year follow-up period, 93% (n = 155) continued to receive care in our health care system.

Among the 188 patients with PDN who were originally identified during the index period, 11% (n = 20) had, at least once, 1 all-cause rehospitalization by 7 days, 18% (n = 34) by 30 days, 41% (n = 77) by 120 days, and 62% (n = 117) by 365 days after index discharge. Overall, during the full 2-year follow-up, 87% (n = 163) of the patients with PDN had been readmitted at least once (planned and unplanned), with a median frequency of 3 rehospitalizations per patient (interquartile range 1–5). For comparison, rehospitalization rates for all patients hospitalized during the index period overall at the hospital were 6% (n = 507) at 30 days and 15% (n = 1208) at 365 days (P < .001).

For all unique patients identified who were hospitalized in the index year and managed forward for 2 years, the total number of rehospitalizations was 7067, the total rehospitalization LOS was 41 795 days, and the total hospital days were 83 593 days. Rehospitalization, LOS, and hospital charges for patients with PDN are presented in Tables 4 and 5. Although patients discharged with PDN accounted for 2% of unique patients hospitalized, patients with PDN accounted for 11% (n = 757) of rehospitalizations, 16% (n = 6489) of total rehospitalization days, and 11% (n = 9314) of total hospital days. Total hospital charges for patients with PDN were $132 567 801, of which unplanned rehospitalizations accounted for 88% ($116 828 655).

Time to unplanned rehospitalization is presented in Fig 2. By 153 days, one-half of the patients with PDN had had an unplanned rehospitalization. By the end of the 2-year follow-up, 77% (n = 144) had had an unplanned rehospitalization. Of 43 patients without an unplanned rehospitalization, 2 had died and 7 were lost to follow-up.

Over the course of the study period, the 188 patients with a PDN care plan at index discharge used 35 different home health agencies at a total of 44 different sites. Forty-seven patients (25%) switched agencies at least once, 66 times overall (range 1–6 switches per patient). One company provided care for 33 patients, whereas 10 agencies cared for 10 to 18 patients. The remaining 24 agencies cared for ≤8 patients, of which 12 agencies only cared for 1 patient.

DISCUSSION

With this longitudinal study of children who were hospitalized, we leveraged a unique CM data set to provide a novel description of the clinical characteristics and hospital use of pediatric patients with PDN who were hospitalized. We found that nearly 1 in 5 of all patients who were hospitalized at our center were discharged with a home health service and/or supply and that 1 in 50 patients was discharged with a PDN care plan. Children discharged with PDN

TABLE 5 Hospital Rehospitalizations, LOS, and Related Charges for Patients Discharged With a PDN Care Plan

	Index Hospitalization	0–7 d	8–30 d	31–120 d	121–365 d	Full 2-y Follow-up	Total (Index + 2 y)
Rehospitalizations							
Total count	—	20	46	113	282	757	—
Unplanned	—	17	43	97	235	639	—
Planned	—	3	3	16	47	118	—
LOS, d							
Total	2825	147	489	1263	2210	6489	9314
Unplanned	2354	135	452	1160	2057	6031	8385
Planned	471	12	37	103	153	458	929
Hospital charges, $[a]							
Total amount	42 793 580	1 649 537	5 899 073	16 352 221	33 248 444	89 774 221	132 567 801
Unplanned	34 482 702	1 649 537	5 409 085	15 003 870	30 863 946	82 345 953	116 828 655
Planned	8 310 878	0	489 988	1 348 351	2 384 498	7 428 268	15 739 146

Rehospitalizations within each time window are shown as well as for the full 2-year follow-up. Patients could have been readmitted more than once in a given window. Day 0 is the first day after discharge from the index hospitalization. Charges were not available for all hospital admissions. —, not applicable.

[a] Hospital charges included direct care items for the patient (such as supplies and drugs), salaries and benefits of care providers on the hospital payroll (eg, nursing), medical administration and professional physician fees, depreciation of equipment, and spaced used for direct patient care.

accounted for a disproportionate frequency of rehospitalizations and hospital days overall, with more than three-quarters having at least 1 unplanned rehospitalization within 2 years.

With this study, we build on the findings of Gay et al,[14] who examined patients cared for by a single PDN agency only. Although CMC who receive PDN are a unique subset of the larger CMC population, we provide in this study new insights about an extremely vulnerable group of pediatric patients who rely on inpatient, outpatient, and home-based PDN providers for their care needs. Research reveals that the majority of pediatric patients with the highest health care use shifts year-to-year, making it difficult to identify a group ripe for clinical initiatives that reduce hospital use.[15] A key contribution of this study is its longitudinal design and 2-year follow-up period, which enabled us to identify that patients with PDN plans of care persistently used hospital care over time. As such, we believe that this study identifies an opportunity to improve care for this group of CMC, both because use of PDN identifies a patient group for intervention and because PDN itself may provide a means by which interventions can be initiated.

CMC receiving PDN have diverse primary diagnoses and are highly dependent on a range of medical technologies, likely because PDN eligibility in our state is determined by the intensity of care needs, especially airway management or home mechanical ventilation. The burden of rehospitalizations, hospital days, and mortality for children with PDN relative to children overall who were hospitalized at our facility was relatively high, particularly given that our institution's concurrent 30- and 365-day rehospitalization rates are lower than published national estimates.[2,16] Notably, in the course of data collection, we found that hospital discharge codes alone did not reliably identify patients discharged with PDN, thereby raising concerns that estimates of home health care that rely on hospital discharge coding may be underestimating home skilled service use. Our technique of using CM to document home health care also captured the larger "pyramid" of home services, supplies, and devices that connects pediatric health care from the hospital to home and reveals that home health care may be used more widely for youth than previously described.

Research regarding pediatric home health care remains sparse. By using home health agency data, it was suggested in 1 recent study that patients discharged with PDN had a lower rehospitalization rate compared with matched controls without PDN.[14] Notably, at our institution, patients with PDN were discharged from the hospital by using a large number of nursing agencies and were also sometimes discharged to postacute facilities as an interim step. The difference between the findings of Gay et al[14] and of this study may reflect this fragmentation of pediatric care across agencies. For an individual patient, changing agencies may impose a lack of longitudinal patient-specific insight, which may inform clinical decision-making. In addition, if pediatric patients are a small proportion of an agency's case load, there may be insufficient volume to accumulate necessary pediatric expertise. Future research is needed to rigorously evaluate how or whether home health care is associated with acute unscheduled care and how state-based Medicaid waivers, which are thought to drive eligibility for PDN, affect longitudinal health outcomes.

Overall, index hospitalizations and first rehospitalizations for children with PDN were dominated by infections (typically respiratory infections) and device complications. The use of PDN to preemptively manage acute illness, including early identification and management of care, is understudied; specifically, little is known about the quality of PDN received by pediatric patients. In our clinical experience, and as indicated in a recent qualitative study, understaffing and

inadequate pediatric training opportunities of nurses may lead to lower than optimal care at home (eg, suction frequency and nighttime monitoring).[17] Alternatively, families may try to maximize home therapies (eg, home respiratory support) without timely collaboration with the medical team before presenting for emergent care, leading to more advanced illness than might otherwise have occurred. Given that the median hospitalization was only 4 days, however, some patients could have benefited from escalation of care at home instead of hospitalization.

National trends toward value-based care may leave hospital systems financially vulnerable when caring for CMC, especially if hospital systems are not well integrated with home- and community-based care models, such as PDN. Although hospitalizations are often evaluated as unique events in time, we found that 88% of hospital charges for this patient population are incurred across recurring, unplanned rehospitalizations. As research and policy efforts continue to pursue how best to minimize hospitalizations, there may be increasing incentives for children's hospitals, whose hospital days and charges are increasingly attributable to CMC, to develop stronger longitudinal connections with home- and community-based services. In addition, planned hospitalizations for CMC may be an underused opportunity to evaluate not just PDN care but to conduct proactive longitudinal care planning, just as acute care primary care visits are often seen as a chance to immunize a child between well-child checks.[18,19]

This study was a retrospective study in a single institution, which may limit generalizability and affect data completeness regarding charge data and the potential for our patients to have been readmitted to other hospitals. Another limitation is that charge data do not reflect actual medical costs, although they have been shown to reliably reflect costs and payments across different models.[20,21] Because of the fact that this study was designed primarily to assess CMC with PDN in detail, there were limitations in the ability to conduct formal hypothesis testing to compare CMC discharged with PDN versus CMC discharged without PDN by using formal matching. Understanding such differences will be important for future multisite patient-matched studies, particularly to understand how eligibility for PDN differs between states and how that might affect CMC outcomes. In addition, although hospital practices led to consistent use of discrete field elements, which enabled patient tracking, the use of free-text CM entries did not enable the ability to evaluate the PDN dose effect (ie, nursing hours).

These limitations notwithstanding, this analysis was based on the unique ability to identify CMC with PDN and to manage them longitudinally over a 2-year period within the context of all children served at a high-volume quaternary medical center that is similar to many institutions nationwide for the care of CMC. The insights from the analysis offer unique contributions to the limited literature on home health care for children.

CONCLUSIONS

CMC at a single center who received PDN services constituted a disproportionate number of rehospitalizations and hospital days among children over a several-year period. Authors of future work should investigate whether PDN (and home care services more broadly) may be supplemented or escalated to manage common acute infections and exacerbations of chronic conditions at home to avoid short-term hospitalizations and to investigate why some patients with PDN were not readmitted whereas others were. However, a better understanding of the current deficits in access and quality of PDN will be needed to achieve these goals, including understanding whether PDN skill level and coverage play a role in rehospitalization (eg, a nurse's ability to address problems with devices and frequency of missed shifts). Lastly, authors of future work should examine how to use planned rehospitalizations as opportunities for planning longitudinal care across the complex teams that provide support for these vulnerable children and their families.

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