Outpatient Follow-Up Visits and Readmission in Medically Complex Children Enrolled in Medicaid

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Objective To examine the association between postdischarge outpatient follow-up and 30-day readmissions in Medicaid enrolled children with complex, chronic conditions.

Study design This was a retrospective cohort analysis of Colorado Medicaid recipients with complex, chronic conditions who were discharged from the hospital between 2006 and 2008. The primary outcome was readmission between 4 and 30 days after index hospital discharge. Using multivariable logistic regression, we examined the association between early postdischarge outpatient visits (≤3 days postdischarge) and readmission. We secondarily analyzed the relationship between any outpatient visit from 4 to 29 days of index discharge and readmission.

Results For the 2415 patients with complex, chronic conditions included in the analysis, the 4- to 30-day readmission rate was 6.3%. The odds of readmission was significantly greater for patients with ≥1 outpatient visit ≤3 days after discharge compared with patients without a visit ≤3 days after discharge (aOR 1.7 [1.1-2.4]). The odds of readmission were significantly lower for patients with ≥1 outpatient visit from 4 to 29 days after discharge compared with patients without such visits (aOR 0.5 [0.3-0.7]). Other factors associated with readmission included index hospital length of stay and number of complex, chronic conditions.

Conclusions In medically complex children, there is a positive association between early postdischarge outpatient follow-up and readmission. There is an inverse association between later postdischarge outpatient follow-up and readmission. Outpatient follow-up occurring within 4-29 days after discharge may help to prevent 30-day readmissions. Additional research is needed to inform guidelines regarding longer term postdischarge outpatient follow-up in these children. *(J Pediatr 2015;166:998-1005)*.

Hospital readmissions are being targeted for reimbursement reform aimed at controlling health care costs[1] among adults[2] and children.[3,4] The transition of care from the hospital represents an opportunity to reduce readmissions, because outpatient visits after discharge can be increased.[5] Although postdischarge outpatient follow-up visits have faced validity as a means of addressing emerging or unresolved problems related to the hospitalization, the impact of postdischarge outpatient follow-up visits on readmissions in children is not understood.[6]

Previous studies of postdischarge outpatient follow-up and readmission in children have either combined findings with adults or focused on single pediatric populations. Nonelderly Delaware Medicaid patients with a postdischarge outpatient follow-up visit were found to have increased readmission rates,[7] whereas others with sickle cell disease[8,9] and psychiatric or substance abuse diagnoses[10,11] were found to have lower readmission rates.

We analyzed the relationship between postdischarge outpatient follow-up and 30-day readmission in Medicaid-enrolled children with complex, chronic conditions. Both public insurance and medical complexity are risk factors for readmission among children.[4,12] Medically complex patients account for a growing share of pediatric inpatient admissions and resource use.[13] Patients on Medicaid may have more difficulty transitioning from hospital to home than the privately insured,[14] and among children with special health care needs, those who are publically insured may have more difficulty accessing a medical home.[15] Reducing readmissions in children with complex, chronic conditions offers an opportunity to control costs, especially if improvements in care transitions planning[16] prove to make a difference.[17]

The objective of this study was to analyze the association between postdischarge outpatient follow-up visits and 30-day readmissions in Medicaid-enrolled children with complex, chronic conditions. Because the days immediately after a discharge are the most vulnerable for readmission,[4] we hypothesized that having an early outpatient visit (≤3 days after discharge) would be associated with lower readmission rates. We also hypothesized that having any outpatient visit between 4 and 29 days after discharge would be associated with fewer readmissions. Findings from this study

CPT-4	*Current Procedural Terminology, 4th edition*
ED	Emergency department
ICD-9	*International Classification of Diseases, Ninth Revision*
LOS	Length of stay
MDC	Major diagnostic category
PCCM	Primary care case management

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could potentially support guidelines for optimal timing of postdischarge follow-up in these children.

Methods

We conducted a retrospective analysis of the 2006-2008 Colorado Medicaid Analytic Extract Data from the Centers for Medicare and Medicaid.[18] We obtained data on children ages 6 months to 18 years, including person-level data on eligibility and service utilization. The lower age limit of 6 months was chosen to have a 6-month look-back period for previous utilization. Complete medical encounters are not necessarily captured with Medicaid claims data for clients on Medicaid managed care or those with restricted benefits, private insurance, enrolled in a state child health insurance program, or Medicare dual eligible.[19] We therefore restricted the cohort to Medicaid fee-for-service, including primary care case management (PCCM) clients, to reliably capture and compare all encounters. On the basis of available data, we estimate that in any given month during our study period, approximately 85% of children enrolled in Medicaid were covered by a fee-for-service/PCCM medical Medicaid plan. Patients were required to be continuously enrolled for 6 months before index admission and 30 days after the index discharge date to identify utilization outcomes of interest. The Colorado Multiple Institutional Review Board approved this study.

We excluded any hospital admissions with pregnancy- and childbirth-related Diagnosis-Related Groups (370-384). These patients comprised almost 30% of patients without complex, chronic conditions and were felt to have sufficiently unique health service use patterns to warrant exclusion. We also excluded chemotherapy admissions (Diagnosis-Related Groups 410, 492; *International Classification of Diseases, Ninth Revision* [ICD-9] procedure codes 99.25, 99.28, or 00.10) because these are usually planned admissions.

After developing a complete cohort of eligible children and hospital admissions, we excluded children without complex, chronic conditions by using a previously defined taxonomy based on ICD-9 codes.[20] The complex, chronic condition classification uses ICD-9 codes to describe medically complex children based on the presence of chronic medical conditions, often in comorbid combination, that are expected to last at least 12 months and are likely to lead to inpatient utilization.[13] Asthma is not included as a diagnosis in this classification.

Finally, we excluded from the analysis all children with complex, chronic conditions who had readmissions occurring within 3 days of hospital discharge to focus on readmissions that occurred among patients who had sufficient time to attend an outpatient follow-up visit. This also addressed the potential problem of reverse causality described in a previous study on mental health readmissions (ie, readmission causing less follow-up care rather than less follow-up care causing readmission).[10]

The index admission for each patient was the first hospitalization between July 2006 and November 2008. Readmission was defined as any subsequent hospitalization from 4 to 30 days after the index admission.

Outpatient visits were determined using the following *Current Procedural Terminology, 4th edition* (CPT-4) codes: 99201-99205 (office or other outpatient visit for the evaluation and management of a new patient), 99211-99215 (office or other outpatient visit for the evaluation and management of an established patient), 99241-99245 (office consultations with new or established patients), 99381-99385 (initial comprehensive preventive medicine evaluation and management), 99391-99395 (periodic comprehensive preventive medicine reevaluation and management), and 99401-99404 (preventive medicine counseling and/or risk factor reduction intervention). In this study, the phrase "outpatient visit" refers to all noninpatient utilization, except that which occurred in the emergency department (ED) as identified by separate CPT-4 codes (see the paragraph to follow). We were not able to accurately distinguish location of service (such as urgent care or office), whether the visit was scheduled, or whether the visit occurred with a primary care provider or subspecialist.

ED encounters were identified using the CPT-4 codes 99281-99285. We excluded ED encounters that occurred on the same day as hospital admission or discharge to avoid misclassification of ED visits that were associated with the index hospitalization or readmission.

Outcomes

Although there are no guidelines for timeframe of outpatient hospital follow-up in pediatric patients, in our experience, hospitalists generally recommend follow-up within a few days of discharge. We chose a 3-day timeframe (outpatient visit within 3 days) to focus on the impact of early follow-up on 30-day readmissions and to allow for patients discharged on a Friday to attend an outpatient appointment on the following Monday.

We performed a secondary analysis to evaluate the quality premise that any outpatient visit occurring between 4 and 29 days of index hospital discharge might prevent readmission. The primary predictive variable was outpatient follow-up within 4-29 days of index discharge (excluding outpatient visits which occurred on the same day, or days following, readmission). Our primary outcome was readmission from 4 to 30 days after discharge from the index hospitalization. This outcome was used for both the primary and secondary analyses.

Covariates

Covariates were categorized as demographic (age, race, sex); utilization (inpatient length of stay [LOS], intensive care use, outpatient/ED utilization before index admission, and outpatient/ED utilization after index discharge); and clinical (no. complex, chronic condition categories, major diagnostic categories [MDCs]). Inpatient LOS and intensive care use were included as potential markers of illness severity. Health care use before the index admission was included in the analysis because published studies have shown an association between health care utilization preceding index hospitalization and readmission. To account for differences in reason for