Resource Utilization for Observation-Status Stays at Children’s Hospitals

WHAT’S KNOWN ON THIS SUBJECT: Hospitalizations under observation status are presumed to be shorter and less resource-intensive, but utilization for pediatric observation-status stays has not been studied.

WHAT THIS STUDY ADDS: Children’s hospitals use observation status with great variation. Resource utilization for pediatric patients under observation status overlaps substantially with inpatient-status utilization, calling into question the utility of segmenting pediatric patients according to billing status.

BACKGROUND AND OBJECTIVE: Observation status, in contrast to inpatient status, is a billing designation for hospital payment. Observation-status stays are presumed to be shorter and less resource-intensive, but utilization for pediatric observation-status stays has not been studied. The goal of this study was to describe resource utilization characteristics for patients in observation and inpatient status in a national cohort of hospitalized children in the Pediatric Health Information System.

METHODS: This study was a retrospective cohort from 2010 of observation- and inpatient-status stays of ≤2 days; all children were admitted from the emergency department. Costs were analyzed and described. Comparison between costs adjusting for age, severity, and length of stay were conducted by using random-effect mixed models to account for clustering of patients within hospitals.

RESULTS: Observation status was assigned to 67,230 (33.3%) discharges, but its use varied across hospitals (2%–45%). Observation-status stays had total median costs of $2559, including room costs and $678 excluding room costs. Twenty-five diagnoses accounted for 74% of stays in observation status, 4 of which were used for detailed analyses: asthma (n = 6352), viral gastroenteritis (n = 4043), bronchiolitis (n = 3537), and seizure (n = 3289). On average, after risk adjustment, observation-status stays cost $260 less than inpatient-status stays for these select 4 diagnoses. Large overlaps in costs were demonstrated for both types of stay.

CONCLUSIONS: Variability in use of observation status with large overlap in costs and potential lower reimbursement compared with inpatient status calls into question the utility of segmenting patients according to billing status and highlights a financial risk for institutions with a high volume of pediatric patients in observation status.

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KEY WORDS
health care finance, hospital costs, hospitalization, hospitalized child, observation status, patient admission, patient discharge, pediatric hospital

ABBREVIATIONS
APR-DRG—All Patient Refined Diagnosis Related Groups
E/M—evaluation and management
LOS—length of stay
PHIS—Pediatric Health Information System

Dr. Fieldston conceptualized and designed the study, assisted with data analysis, reviewed and revised the manuscript, critically reviewed the manuscript, and approved the final manuscript as submitted; Drs. Shah, Hain, Alpern, and Macy assisted in conceptualizing and designing the study, assisted with data analysis, reviewed and revised the manuscript, critically reviewed the manuscript, and approved the final manuscript as submitted; Dr. Hall conducted the initial data extraction and analyses, wrote sections of the manuscript, reviewed and revised the manuscript, and approved the final manuscript as submitted; and Dr. Del Beccaro and Mr. Harding assisted in conceptualizing and designing the study, assisted with data analysis, reviewed and revised the manuscript, and approved the final manuscript as submitted. Dr. Hall had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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In 1983, with the introduction of the Medicare prospective payment system, reimbursement for inpatient services was restructured to encourage efficiency by providing a predetermined, fixed payment to hospitals for care of adults within diagnosis-related groups regardless of length of stay (LOS). Over the ensuing years, the concept of “observation status” emerged as a designation for patients not meeting inpatient diagnosis-related group criteria and deemed by payers to be in a state of clinical decision-making between discharge-to-home and admission-to-inpatient status. Observation status is considered to be “outpatient” or “ambulatory” for evaluation and management (E/M) coding, even if the stay is in an inpatient bed and extends past 24 to 48 hours for Current Procedural Terminology coding. The concept of observation status spread to non-Medicare payers to include pediatric hospitalizations. Observation status is a billing designation for both hospital and physician payments, with reimbursement typically lower compared with inpatient status because observation-status stays are presumed to be less resource-intensive. Observation status is determined by payers, typically by using criteria provided by InterQual and Milliman, which differ from each other, adding to the inconsistency. But, providers caring for observation-status patients may not differentiate them from inpatient-status patients. The care team may not know the billing status during hospitalization. Inconsistent application of billing status may lead to patients of the same complexity and LOS, with the same resource utilization, being coded as observation status in one hospital and inpatient status in another hospital or even within the same hospital.

To understand the potential impact of pediatric observation-status stays on hospital finance, we sought to describe resource utilization of pediatric observation-status stays at freestanding children’s hospitals. An improved understanding of pediatric patients in observation billing status is needed to help guide clinicians, hospital administrators, regulators, and policy makers, particularly in the face of impending Medicaid audits of inpatient billing similar to the Medicare Recovery Audit Contractor program. Our specific aims were to describe the resource utilization for observation-status stays compared with inpatient-status stays with similar LOS and diagnoses. We hypothesized that no clinically significant difference in resource utilization will be present when comparing observation-status with inpatient-status hospitalizations of similar LOS and diagnoses.

METHODS

Study Design and Data Source

Data for this multicenter retrospective cohort study were obtained from the Pediatric Health Information System (PHIS), which contains demographic and resource utilization data from 43 freestanding children’s hospitals. Participating hospitals are located in noncompeting markets of 27 states plus Washington, DC, and account for 20% of all pediatric hospitalizations in the United States. The PHIS database contains billed charges for each hospitalization. Each of these billed clinical activities can be assigned a standardized cost, derived from the median cost across all PHIS hospitals for that service. In this way, resource utilization can be compared without biases arising from using charges or costs estimated by using the cost-to-charge ratio. Data are deidentified before inclusion. The Children’s Hospital Association (formerly Child Health Corporation of America) (Overland Park, KS) and participating hospitals jointly assure data quality.

Study Participants

Of the 43 hospitals in PHIS, 33 reported data from observation-status and inpatient-status stays, and analyses were limited to these hospitals. The 10 hospitals not included did not report any patients in observation status. Patients admitted to observation or inpatient status during the calendar year 2010 from the ED and who stayed ≤2 days (ie, crossed no more than 2 midnights and defined as integer days) were included, representing 97.8% of all observation-status stays. We purposely limited our study to stays of ≤2 days, not only because of this preponderance of data but also because the Center for Medicare & Medicaid Services defines observation status as typically ranging from 24 to 48 hours. We then compared observation-status stays with a corresponding cohort of inpatient-status stays of ≤2 days (47.5% of all inpatient-status stays). Patients who spent any time in an ICU were excluded because ICU care does not seem consistent with the intent of observation status (although there were 342 [0.3%] patients with LOS ≤2 days who had observation status billing with an ICU charge). Patients who died during the hospitalization were excluded.

Data Analysis

Patient stays were categorized into All Patient Refined Diagnosis Related Groups (APR-DRGs), version 24. We described patient visit and resource utilization characteristics, including for patients: age, gender, race, payer, LOS, total costs, costs grouped
according to category (imaging, laboratory, pharmacy, supply, clinical, room, and other), and severity of illness based on APR-DRG. For hospitals, the following factors are described: payer mix, percentage of patients who are complex (those with complex chronic conditions, neurologic conditions, or technology dependence), and percent surgical cases. APR-DRGs were ordered according to frequency. The top 25 APR-DRGs (Supplemental Table 3) in the observation-status list were used to generate a corresponding list of inpatient-status stays meeting inclusion/exclusion criteria. Costs, both including and excluding room costs, were compared for observation and inpatient statuses in aggregate for this list of 25 APR-DRGs. We separated room from nonroom charges to specifically evaluate clinical needs of patients. In addition, room costs can overwhelm other costs, making this separation important for effective analysis of resources used for care. Among the top 25 APR-DRGs for observation-status stays, 4 common diagnosis groups with clinical relevance and known validity of coding were chosen for detailed analysis: asthma (no. 1), gastroenteritis (no. 2), bronchiolitis (no. 4), and seizure (no. 5). Within these 4 conditions, we compared costs associated with observation-status versus inpatient-status stays matched on APR-DRG using random-effect mixed models to account for clustering of patients within hospitals. We risk-adjusted the cost models by using APR-DRG severity of illness, age, and LOS and produced least squares means from the resulting models. We hypothesized that no clinically significant difference in resource utilization, as measured by using costs, would be present when comparing observation-status with inpatient-status hospitalizations. We tested our hypothesis for total cost with and without room costs and for each cost category. Statistical analysis was performed in SAS version 9.3 (SAS Institute, Inc, Cary, NC), and P values <.05 were considered statistically significant.

RESULTS
Sample Characteristics
Patient demographic characteristics are presented in Table 1. Observation status was assigned to 67 230 (33.3%) and inpatient status was assigned to 134 476 (66.7%). Among the observation-status stays, the mean LOS was 1.1 ± 0.3 days. The top 25 APR-DRGs (Supplemental Table 3) represent 49 884 (74.2%) of observation-status stays meeting inclusion criteria. There were 83 565 inpatient-status stays for these top 25 APR-DRGs, representing 62.1% of inpatient-status stays meeting inclusion criteria. The 4 APR-DRGs chosen for detailed analysis represent a total of 50 600 discharges (24.8% of all observation-status stays, and 8.5% of all inpatient stays).

Costs Associated With All Observation-Status Stays of ≤2 Days
Aggregated costs for all observation-status stays of ≤2 days were $413.9 million, with median costs including room of $2559 (interquartile range [IQR]: 1650–4045); costs excluding room were a median of $678 (IQR: 315–1286) (full range, 8–16 965). Within the top 25 APR-DRGs in observation status,

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>Patient Demographic Characteristics of All Patients Admitted From the Emergency Department With LOS of ≤2 Days in Either Observation Status or Inpatient Status (Not Only the Top 25 APR-DRGs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristic</td>
<td>Observation Status</td>
</tr>
<tr>
<td>Total</td>
<td>67 230</td>
</tr>
<tr>
<td>Age, y</td>
<td>22 555 (33.55)</td>
</tr>
<tr>
<td>≤1</td>
<td>17 161 (25.53)</td>
</tr>
<tr>
<td>1–5</td>
<td>16 045 (23.87)</td>
</tr>
<tr>
<td>6–12</td>
<td>10 591 (15.75)</td>
</tr>
<tr>
<td>&gt;18</td>
<td>878 (1.31)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>29 431 (43.84)</td>
</tr>
<tr>
<td>Female</td>
<td>37 709 (56.16)</td>
</tr>
<tr>
<td>Race</td>
<td></td>
</tr>
<tr>
<td>Non-Hispanic white</td>
<td>33 484 (52.88)</td>
</tr>
<tr>
<td>Non-Hispanic black</td>
<td>18 890 (29.84)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>10 070 (15.9)</td>
</tr>
<tr>
<td>Other</td>
<td>970 (1.37)</td>
</tr>
<tr>
<td>Payer type</td>
<td></td>
</tr>
<tr>
<td>Government</td>
<td>32 352 (48.12)</td>
</tr>
<tr>
<td>Private</td>
<td>22 938 (34.12)</td>
</tr>
<tr>
<td>Other (includes self-pay, others)</td>
<td>11 940 (17.76)</td>
</tr>
<tr>
<td>% complex</td>
<td>11 067 (16.46)</td>
</tr>
<tr>
<td>% surgical</td>
<td>8673 (12.6)</td>
</tr>
<tr>
<td>Standardized total cost median (IQR)</td>
<td>25 589 (1650–4043)</td>
</tr>
<tr>
<td>Clinical*</td>
<td>141 [0–395]</td>
</tr>
<tr>
<td>Pharmacy</td>
<td>72 [18–181]</td>
</tr>
<tr>
<td>Laboratory</td>
<td>73 [0–211]</td>
</tr>
<tr>
<td>Imaging</td>
<td>64 [0–160]</td>
</tr>
<tr>
<td>Supply</td>
<td>25 [0–138]</td>
</tr>
</tbody>
</table>

Data are presented as n (%)..
*Clinical services refers to a long list of hospital services or activities not classified as imaging, laboratory, or pharmacy services and also not professional services (although a professional service may be associated with the hospital billing activity). These include electrocardiogram, EKG, pneumograms, chest physiotherapy, mechanical ventilation, oxygen therapy, dialysis, transfusions, and physical, occupational, and speech therapy.
aggregate costs for observation-status stays totaled more than $95 million. Within the top 25 APR-DRGs, median costs for observation-status stays including room costs were $2516 (IQR: 1638–3922). When excluding room costs, the median costs were $651 (IQR: 509–1236). Costs for these 25 APR-DRGs ranged from $19 to $51,864 including room costs, and $4 to $12,842 excluding room costs. For the selected 4 APR-DRGs, the range of reported costs was $19 to $6505 including room costs, and $5 to $2730 excluding room costs.

When evaluating all stays under observation status, the largest cost contributor to the observation-status stays was room, followed by clinical, laboratory, and pharmacy fees. There were 31 observation-status patients (0.05% of observation status total) who generated pharmacy costs more than $10,000, accounting for more than $508,577 in aggregate pharmacy costs. The most common diagnoses for these outliers included coagulation disorders (eg, idiopathic thrombocytopenic purpura) (n = 11), toxic effect of venom (n = 3), and inborn errors of metabolism (n = 9).

**Costs for Observation-Status Versus Inpatient-Status Stays That Were ≤2 Days**

Within the top 25 ranking APR-DRGs, there was substantial overlap in costs for observation-status and inpatient-status stays (Fig 1). For the selected 4 APR-DRGs, there was again substantial overlap in costs for observation status and inpatient status (Fig 2 A–D). Observation-status patients had consistently lower nonroom costs compared with inpatient-status patients, but while the average severity-adjusted differences in costs between observation-status and inpatient-status stays were statistically significant, the dollar amounts were small (Table 2). For example, the average severity-adjusted difference in median costs for laboratory tests for patients with asthma was $23 lower for observation status compared with inpatient status (P < .001).

**Observation Status Use Between and Within Hospitals**

Observation-status use for the top 25 APR-DRGs was variable across hospitals; 9 of the 33 hospitals reporting observation status to PHIS applied it to >30% of discharges for patients with LOS ≤2 days. Within the 25 APR-DRGs, the application of observation status by the 33 hospitals ranged from 2% to 45%. Observation status accounted for 26% to 50% of total hospital costs associated with ≤2-day stays in 14 hospitals and >50% of costs in 8 hospitals.

In addition to between-hospital variation, we also noted substantial within-hospital variation in the use of observation status compared with inpatient status for the selected 4 APR-DRGs. Within the 4 APR-DRGs, there was less than a 25 percentage point difference between

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**FIGURE 1**

Overlap of observation-status and inpatient-status stay costs for top 25 APR-DRGs, limited to LOS ≤2 days, no deaths, and no ICU stays. Comparing distribution of costs for observation-status versus inpatient-status stays, excluding room costs. Substantial distribution of costs overlapped; 25 to 75th percentile (%ile) for costs for observation-status costs extends from $1639 to $3522, whereas the 25 to 75th %ile for inpatient-status costs extends from $2009 to $4615. Max, maximum.
the highest and lowest percentage of observation-status stays in 16 hospitals, a 25 to 50 percentage point difference in 15 hospitals, and >50 percentage point difference in 2 hospitals. There was also variability in the APR-DRGs that represented the highest and lowest percentage of observation-status stays within hospitals (Fig 3).

**DISCUSSION**

We demonstrated that observation status has variable use at the patient and hospital levels. Some hospitals use observation status at a low rate, whereas others have more than one-third of stays ≤2 days in this status. Observation-status stays have substantial overlap with inpatient stays in terms of costs (Figs 1 and 2). When severity adjusted, these findings persisted

<table>
<thead>
<tr>
<th>APR-DRG</th>
<th>Total Including Room Costs</th>
<th>Total Excluding Room Costs</th>
<th>Clinical Costs</th>
<th>Imaging Costs</th>
<th>Laboratory Costs</th>
<th>Pharmacy Costs</th>
<th>Supply Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seizure</td>
<td>-451 (.629)</td>
<td>941 (250)</td>
<td>756 (.355)</td>
<td>40 (&lt;.001)</td>
<td>55 (&lt;.001)</td>
<td>88 (.001)</td>
<td>2 (.798)</td>
</tr>
<tr>
<td>Bronchiolitis</td>
<td>-2270 (&lt;.001)</td>
<td>350 (.061)</td>
<td>316 (.085)</td>
<td>-4 (.031)</td>
<td>22 (&lt;.001)</td>
<td>16 (.618)</td>
<td>0 (.940)</td>
</tr>
<tr>
<td>Asthma</td>
<td>1366 (&lt;.001)</td>
<td>1535 (&lt;.001)</td>
<td>1442 (&lt;.001)</td>
<td>1 (&lt;.585)</td>
<td>23 (&lt;.001)</td>
<td>77 (.002)</td>
<td>-6 (.001)</td>
</tr>
<tr>
<td>Gastroenteritis</td>
<td>-1329 (&lt;.001)</td>
<td>-155 (889)</td>
<td>-209 (579)</td>
<td>22 (&lt;.001)</td>
<td>44 (&lt;.001)</td>
<td>0 (.992)</td>
<td>-12 (.006)</td>
</tr>
</tbody>
</table>

Values equal inpatient-status costs minus observation-status costs. Values in parentheses are P values from testing if the difference is significantly different than zero. Positive values indicate inpatient-status > observation-status standardized cost, whereas negative values indicate observation-status > inpatient-status. Adjusted for age, APR-DRG severity of illness, and LOS, so that value differentials do not correspond to absolute differences in Fig 1.

*a Clinical services refers to a long list of hospital services or activities not classified as imaging, laboratory, or pharmacy services and also not professional services (though a professional service may be associated with the hospital billing activity). These include electrocardiogram, EEG, pneumograms, chest physiotherapy, mechanical ventilation, oxygen therapy, dialysis, transfusions, and physical, occupational, and speech therapy.
for most cost categories across the conditions (Table 2). This finding suggests that comparable clinical care may be required by observation-status and inpatient-status stays of similar short duration. In aggregate, observation-status stays comprise a substantial amount of costs for pediatric hospital-based care. These findings are relevant not only for administrators and policy makers but for families and clinicians as well. It seems that hospitals and clinicians are providing equivalent care from a resource utilization perspective, but due to poorly defined and inconsistently applied criteria for pediatric observation status, payment may be lower and patients may be at risk for higher out-of-pocket costs.

The vast majority of observation-status stays (>99%) were lower-cost, shorter hospitalizations, and were discharged with diagnoses that match the conditions commonly treated within observation units.7,18,19 However, designated observation units for children are not common, even in children’s hospitals.6,20,21 Therefore, we suspect that most patients in our analysis were cared for in a regular inpatient unit. Hospitals with designated observation units have identified benefits in terms of reductions in LOS and associated costs. Such benefits may not be realized without an organizational framework and processes of care that match resources to the needs of patients staying 1 to 2 days (who comprise a large proportion of pediatric hospitalizations).22–24

Our findings raise the concern that for many observation-status patients it is difficult to determine ex post facto in administrative data why some are in observation status and some in inpatient status, even within the same hospital. The large overlap in costs and variability in use call into question the utility of segmenting patients according to billing status. The findings in the current study suggest there has been a shift away from the original intention of the observation-status designation, which was established to pay for services rendered while clinicians were determining patient’s need for admission to the hospital, expected to take <24 to 48 hours.25 High-intensity medical services of brief duration, leading to quick clinical resolution, may receive lower reimbursement associated with observation-status designation and consequently have implications for hospital finance in children’s hospitals.

There are available standards (InterQual, Milliman) for determining billing status, but the application of these standards varies within and across hospitals depending on individual contracts with payers.6 Furthermore, these standards were originally written for adults, and although there are now some pediatric-specific criteria published, many do not take into account the different disease courses based on ages and developmental stages of pediatric patients. There is concern that
patients of the same level of complexity and LOS may be inconsistently coded as observation status in 1 hospital and inpatient status in another, or even within the same hospital. Moreover, the lack of inclusion of observation-status patients in hospital utilization statistics is concerning, as the population of observation-status patients is growing and consuming resources yet is excluded from most resource utilization analyses.

Clinicians who spend time justifying hospitalization status, conversing with payers, and facing potential audits due to incongruent coding of observation status versus inpatient status or for coding too many of their patients as inpatient status (despite the patient’s clinical care being similar) should also be aware of these findings. The use of billing designations without clinical relevance also creates distractions and interruptions to clinical work. For physicians who do their own coding and billing, these findings are directly relevant.

Payers often contract with hospitals for lower reimbursement for observation-status stays. The Current Procedural Terminology codes for E/M are different for observation ("ambulatory") E/M codes than for the corresponding inpatient E/M codes. Given the risk of lower reimbursement for observation status, these cases may represent a financial burden on children’s hospitals and clinicians, who may be doing the same work regardless of classification of inpatient versus observation status. An additional area of concern is that costs of observation stays may be passed on to families because observation is defined by payers as outpatient care with higher cost-sharing than typical inpatient coverage. Although not currently a concern for most children, Medicare recipients with observation-status stays have different eligibility for skilled nursing facilities; if private or public insurers for children take similar stances, observation-status stays would be an even greater concern to the disposition of patients.

Given the costs to hospitals and payers associated with determining observation status, and the potential for differentials in a family’s financial responsibility, there is a need to further evaluate the use of observation status for pediatric patients. Simply extending Medicare rules or arbitrarily designating short stays as observation status opposes the uniqueness of children and the often intense but brief therapies they receive in hospitals. Given the recent announcement of Medicaid audits, clearer definitions for pediatric observation status would be valuable. Hospitals and payers may wish to collaborate to better understand the dynamics of pediatric care with the goal of developing better clinical criteria that will allow for greater consistency in use of observation status. Perhaps a new case-based reimbursement model could be developed for short-stay patients who would not require any administrative or concurrent review to determine status. This may require some carve-outs, such as for high-cost drugs, or a complexity code for patients who stay a short period of time but have comorbid conditions that require more resources.

There are several limitations to this analysis. First, because only freestanding children’s hospitals were included, the findings may not be generalizable to other populations. Nonetheless, these hospitals represent the majority of their type, and their experiences likely reflect what other hospitals caring for children experience. Second, database errors related to coding of diagnosis, admission type, costs, and dates would affect the results. It is hard to estimate the direction of bias, as miscoding could lead to the appearance of higher or lower LOS and/or costs, although there is no obvious reason why this would be more likely in observation-status versus inpatient-status stays. Similarly, extreme values in costs when the full range was provided (although not the IQR) raise questions about coding of activities and their associated costs. However, it is possible for patients to generate few charges (and thus costs) while they occupy a bed for true observation (often billed at an hourly rate, generating smaller room charges than a per diem); conversely, expensive services or medications may be administered, raising costs for stays deemed observation status by payers.

Third, although we have limited information about the use of coding practices at each hospital and to the extent that hospitals do not have payers that recognize observation status, admissions may not be categorized that way. For example, of 43 hospitals in PHIS, 10 did not have any patients in this status, which may be because they do not use observation status or because they did not report its use. In addition, hospitals may be paid at an observation rate for all or some days of a hospitalization, even if the stay is coded as inpatient status in PHIS. Fourth, we do not know whether observation-status patients were treated in observation units or in inpatient units. Finally, we used costs as a proxy for clinical needs of patients. Although imperfect, costs convey the acuity and complexity of patients because it reflects the resources used to treat them.

CONCLUSIONS

There was significant variation in resource utilization for patients hospitalized under observation status and in the use of this status within and between hospitals. When compared
with inpatient-status patients with similar diagnoses, patients coded as observation status often had similar utilization, suggesting similar clinical needs. Further research is needed to better understand the characteristics of pediatric patients discharged under observation status. It is important to determine the extent to which observation status reflects the duration of hospital stay rather than low intensity of service. The more it resembles the latter, the more hospitals need to have organizational frameworks and processes that match resources to the lower-intensity but high-turnover needs of patients. For those with short stays that require high-intensity care, reimbursement should appropriately match this level of care, and the status should not be coded as observation.

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