The Pediatric Hybrid Observation Unit: An Analysis of 6477 Consecutive Patient Encounters

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ABSTRACT. *Objectives.* **Pediatric observation units (OUs) are becoming more common in hospitals throughout the United States, providing physicians with a new disposition option for children who are judged to be too ill for home management. Some OUs function as "hybrid" units, serving both acutely ill and injured observation patients as well as scheduled elective procedure patients. How best to utilize this new resource is not yet defined. We studied the utilization of our pediatric hybrid OU during the first 2 years of operation to determine (1) the spectrum and frequency of diagnoses treated, (2) diagnoses and procedures most (and least) likely to attain discharge successfully within 24 hours, and (3) whether age was associated with inability to be discharged from the OU within 24 hours.**

Methods. **The study setting was a 20-bed hybrid OU located in a pediatric tertiary care hospital in Salt Lake City, Utah. The records of all patients admitted during the first 2 years of OU operation, from August 1999 through July 2001, were examined retrospectively.**

Results. **There were 6477 OU admissions: 4189 (65%) for acutely ill and injured observation patients and 2288 (35%) for scheduled elective procedure patients. For the observation patients, median age was 2.5 years and median length of stay was 15.5 hours. Common admission diagnoses in these patients included enteritis/dehydration ($n = 722$), orthopedic injuries ($n = 362$), asthma ($n = 327$), closed head injury ($n = 289$), urgent transfusion/infusion ($n = 221$), bronchiolitis ($n = 212$), croup ($n = 207$), abdominal pain ($n = 199$), cellulitis ($n = 177$), and nonfebrile seizure ($n = 98$). Overall, 15% of observation patients required subsequent inpatient admission for >24-hour stay. Observation diagnoses that were most likely to require inpatient admission were hematochezia (60%), viral pneumonia (46%), and bronchiolitis (43%). We demonstrated successful OU discharge rates (>85%) for several diagnoses not commonly reported: neonatal hyperbilirubinemia, aseptic meningitis, and diabetic ketoacidosis in the patient with known diabetes. Among the scheduled elective procedure patients, median age was 5.0 years and median length of stay was 3.0 hours. Only 1% of these patients required subsequent inpatient admission. In both populations, age ≤30 days was associated with increased need for inpatient admission, with a relative risk of 1.9 (95% confidence interval: 1.4–2.6) among the observation patients and 13.9 (95% confidence interval: 3.0–65.0) among scheduled procedure patients.**

Conclusion. **Our pediatric hybrid OU played an important role in the treatment of children who were admitted for observation as a result of acute illness or injury, as well as children who required scheduled procedures. For both patient types, we identified diagnoses that are most and least likely to attain successful discharge within 24 hours. The majority (85%) of observation patients were discharged successfully within 24 hours. Successful discharge rates for diagnoses that are not commonly managed in other pediatric OUs were reported. We identified certain age groups within selected diagnoses that may not have been appropriate for the OU.** *Pediatrics* **2005;115:e535–e542. URL: www.pediatrics.org/cgi/doi/10.1542/peds.2004-0391;** *emergency department, emergency medicine, hospitalization, pediatric, observation unit.*

ABBREVIATIONS. OU, observation unit; ED, emergency department; PCMC, Primary Children's Medical Center; LOS, length of stay; RR, relative risk; CI, confidence interval.

Observation units (OUs), also known as short-stay units or rapid treatment units, are dedicated areas where patients may be treated or observed for a defined time period to determine the need for inpatient admission.[1–4] By offering evaluation and treatment beyond that provided by an emergency department (ED), OUs have the potential to improve the quality of medical care while reducing inpatient admissions, liability, and health care costs.[5–10] Many OUs function as "hybrid" units serving 2 very different types of patients within 1 physical setting: (1) acutely ill and injured "observation" patients and (2) scheduled elective procedure patients. There is evidence that hybrid OUs may have a more uniform patient census throughout the day, improving staff utilization.[11]

Pediatric OUs are becoming more common in hospitals throughout the United States. A recent survey of 522 hospitals within the United States noted that 19% had OUs, 64% of which treated children.[12] Furthermore, there are data indicating that observation care could potentially replace inpatient medical admissions in 39% of pediatric patients.[13] The increasing availability of OUs in which to treat children provides pediatricians and ED physicians with a new disposition option for children who are judged to be too ill for home management. How best to utilize this new resource is still undefined, however. This was acknowledged in a recent overview of pediatric ob-

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servation medicine[1]: "There has been a scarcity of information about pediatric observation medicine . . . further research into the use of pediatric observation units is needed." Ironically, a similar view was expressed 10 years earlier in the same journal.[14]

Maximizing the utility of a pediatric OU depends on admitting patients who can be discharged from the hospital within a specified time limit, usually 24 hours. Patients who cannot be discharged from the OU within the defined time limits require subsequent inpatient admission for additional medical treatment. There is limited pediatric information regarding disposition outcomes for specific OU diagnoses. This information may help to prevent the OU admission of children who would have been more appropriately treated in a traditional inpatient hospital ward and may also identify diagnoses not previously considered appropriate for OU treatment. There are also limited pediatric OU data regarding patient age and its relationship with OU disposition. Some OUs do not admit children who are younger than 1 month or even 1 year.[1] More information is needed to determine whether it is appropriate to exclude children from the OU on the basis of age.

The objective of this study was to review the utilization of our pediatric hybrid OU by the 2 groups of patients it serves: observation patients and scheduled procedure patients. For each of these patient types, we sought to determine (1) the spectrum and frequency of diagnoses treated, (2) diagnoses or procedures most and least likely to be associated with successful discharge within 24 hours, and (3) whether age was associated with inability to be discharged from the OU within 24 hours.

METHODS

The study setting was the OU at Primary Children's Medical Center (PCMC), a freestanding pediatric tertiary care hospital located in Salt Lake City, Utah. The study OU opened in 1999 and is located adjacent to the 23-bed ED, which serves 5 western states and had an annual volume of 36 000 patients at the time of the study. The OU is officially named the "Rapid Treatment Unit," reflecting the position that accelerated treatment is a fundamental aspect of observation medicine. Two categories of patients are served by this "hybrid" OU: "observation patients" with acute medical and surgical illnesses (eg, gastroenteritis, asthma, orthopedic injuries) and "scheduled procedure patients," whose OU admission was planned to facilitate the performance of a medical procedure (eg, biopsy, lumbar puncture) and the sedation often required.

Observation patients are selected for admission by the ED attending physician in consultation with the OU attending physician. Although the majority of observation patients are evaluated initially in the ED, observation patients may also be admitted directly from community clinics or non-ED hospital areas at the OU attending physician's discretion. OU admission is deemed appropriate for patients whose care is expected to last between 4 and 24 hours. At the time of the study, specific written guidelines for OU admission were not used, although physicians were encouraged to consider the general OU guidelines as defined by the American College of Emergency Physicians[2]: (1) clear patient care goals, (2) limited need for intense medical services, (3) limited severity of illness, (4) anticipation of discharge home within time limits, and (5) a clinical condition appropriate for observation. The American College of Emergency Physicians defines "appropriate conditions" as (1) a diagnostic evaluation, (2) conditions requiring short-term therapy, or (3) psychosocial needs. Before the OU opening in 1999, the disposition of patients from the ED who might have been suitable for observation status (requiring treatment <24 hours) is not known.

The scheduled procedure patients are admitted to the OU on a "space available" basis, with some visits being scheduled weeks in advance. Before the OU opening, the patients with scheduled procedure were treated in our same-day surgery unit, admitted to an inpatient bed, or treated in the outpatient clinics located in our hospital, depending on bed availability and treating physician preference.

The OU is administered and staffed by the Division of Pediatric Emergency Medicine, composed of board-certified pediatric emergency medicine physicians and pediatricians. The OU attending physician (from the division of Pediatric Emergency Medicine) is responsible for all general pediatric observation patients, examining them every 4 to 6 hours. Subspecialty physicians are permitted to admit and take responsibility for their own OU patients. For scheduled procedure patients, the physician performing the procedure serves as the attending of record. The OU nurse-to-patient ratio is 1:4. The unit receives full-time dedicated ancillary support via 2 patient care assistants. A health unit coordinator (clerk) is available 16 hours each day.

We performed a retrospective study of all patients who were admitted to the OU during the first 2 years of operation. Patients were initially identified using the PCMC ED patient tracking program (Logicare, Eau Clair, WI). Computerized and written medical records were obtained for data abstraction by the principal investigator (M.Z.). Data collected from the medical record included route of OU admission (prescheduled, via the ED, or directly from an outpatient clinic or private office), principle admission diagnosis, age, length of stay (LOS), attending service, principal discharge diagnosis, and disposition from the OU (either discharge home or subsequent inpatient admission for continued medical care). Successful OU discharges were defined as those occurring within 24 hours of OU admission. Patients who were in need of continued medical care beyond 24 hours required inpatient admission to a traditional ward service. Patients who were discharged from the OU and readmitted to any unit in the hospital within 72 hours were not considered to have been discharged successfully.

Data were analyzed using SPSS software (version 11; SPSS Inc, Chicago, IL). Descriptive statistics were used. Stratified age groups were compared by the χ^2 test with respect to need for medical care beyond 24 hours. $P < .05$ was considered statistically significant. All reported P values are 2-sided. Relative risk (RR) was calculated with 95% confidence intervals (CIs). The University of Utah Institutional Review Board approved this study.

RESULTS

A total of 6477 patients were admitted to the OU during the 2-year study period from August 1, 1999, through July 31, 2001. Of this total, 4189 (65%) were observation patients and 2288 (35%) were scheduled procedure patients. Table 1 describes these 2 populations. OU physicians from the division of Pediatric Emergency Medicine were most often the attending of record for both populations. Figure 1 shows the age distribution of both patient groups. The observation patients were younger and had a longer LOS than the scheduled procedure patients. An average of 234 observation patients and scheduled procedure patients per month were treated in the OU during its first year of operation, increasing 25% to 305 patients per month during the following year.

Observation Patients ($N = 4189$)

Overall, 5.8% of the 67 528 patients who were seen in the PCMC ED during the 2-year period were admitted to the OU. This represents 31% of all patients admitted from the ED to any unit in the study hospital. Figure 2 depicts monthly numbers of ED patient visits, ED patients admitted to inpatient units, and ED patients who were admitted to the OU. An average of 151 observation patients were admitted to the OU from the ED during each month of

TABLE 1. Population Characteristics of OU Patients

	Observation Patients (N = 4189)	Patients With Scheduled Procedure (N = 2288)
Median age, y	2.5	5.0
Median LOS, h	15.5	3.0
Percent who required subsequent IA	15	1
Evaluated first in ED, %	93	0
Attending physician responsible, %		
Pediatric emergency medicine	76	47
Orthopedic Surgery	9	3
General surgery	5	2
Hematology/oncology	3	1
Anesthesia		19
Gastroenterology		11
Nephrology		4
Other	7	13

IA indicates inpatient admission for care beyond 24 hours.

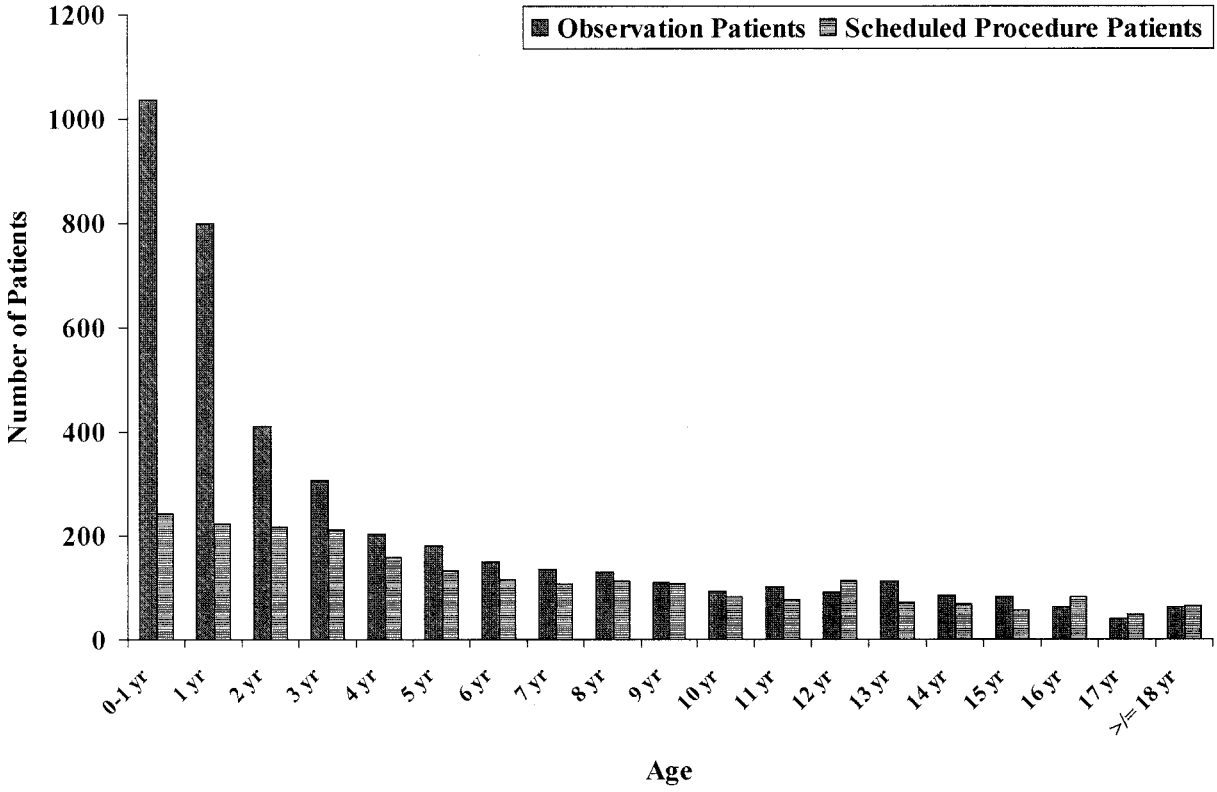

Fig 1. Number of observation patients and scheduled procedure patients according to age.

study year 1, increasing 31% to 198 patients per month in the second year. This represents 5.3% of ED visits in year 1 and 6.2% of ED visits in year 2.

In addition to observation patients who were admitted from the ED, 303 observation patients were admitted to the OU directly from outpatient clinics (without PCMC ED evaluation). The number of direct admissions to the OU rose from 70 (3.9% of 1808) in study year 1 to 233 (9.8% of 2381) in the second year. The majority of direct admissions were for urgent transfusion/infusion (70%), followed by bowel cleanout for constipation (9%) and postoperative complications (3%).

Table 2 lists the 20 most common observation diagnoses encountered in the OU and the median patient age, LOS, and percentage requiring inpatient admission for continued medical care. These 20 diagnoses represent 83% of all observation patient admissions. OU admissions for acute gastroenteritis with dehydration (N = 722; 17% of observation patient admissions) occurred at twice the frequency of the next most common admission diagnoses, orthopedic injury (N = 362; 9%) and asthma (N = 327; 8%). Patients with closed head injury included patients with small intracranial hemorrhage, skull fracture, and/or concussion. The median ages of the most common diagnoses varied widely, from age 1 month to 9 years. Urgent blood transfusions/infusions demonstrated the shortest LOS, with a median stay of 5 hours. Median LOS for the other common diagnoses ranged from 12 to 23 hours. The need for inpatient admission for these diagnoses ranged from 0% to

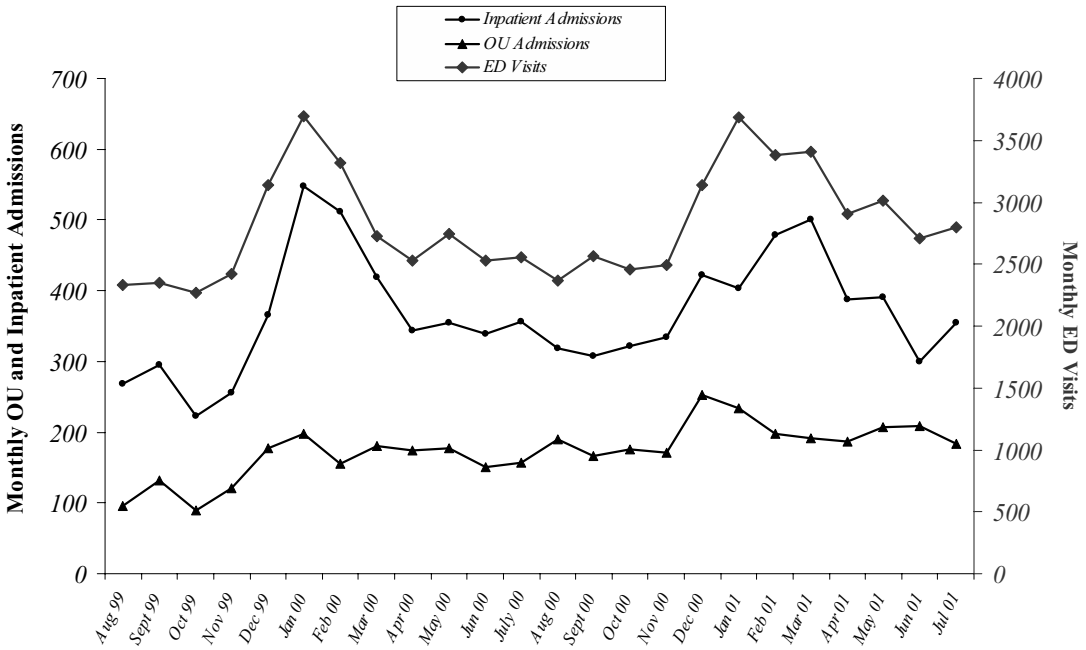

Fig 2. Patient volume per month. ♦, patient visits to the ED (scale on right); ●, inpatient admissions from the ED, not including patients who failed OU (scale on left); ▲, OU admissions from the ED and community, not including patients with scheduled procedure (scale on left).

TABLE 2. The 20 Most Frequent Observation Diagnoses

Diagnosis	*n*	Age, y		LOS, h		IA, %
		Median	95% CI	Median	95% CI	
Acute gastroenteritis	722	1.2	1.1–1.3	18.3	17.8–18.8	16
Orthopedic injury	362	5.0	5.0–6.0	12.9	12.5–13.8	3
Asthma	327	2.6	2.4–2.8	16.5	15.5–17.3	22
Closed head injury	289	5.0	4.0–6.0	13.3	12.5–14.3	5
Urgent blood transfusion/infusion	221	8.0	5.0–11.0	4.8	4.0–5.5	2
Bronchiolitis	212	0.3	0.3–0.4	20.3	19.0–22.0	43
Croup	207	1.5	1.4–1.8	13.8	12.8–14.5	4
Abdominal pain	199	9.0	9.0–10.0	14.0	12.8–15.3	27
Cellulitis	117	4.0	3.0–5.0	20.0	19.0–22.0	15
Seizure (not febrile)	98	3.0	2.4–4.0	16.1	15.0–17.3	18
Bacterial pneumonia	92	1.9	1.6–2.6	19.5	16.5–21.0	30
Foreign body aspiration/ingestion	92	1.8	1.4–2.4	11.6	10.5–13.5	5
Toxic ingestion	86	1.9	1.8–2.3	12.1	10.3–14.0	5
Urinary tract infection	81	1.2	0.7–3.0	18.3	16.0–19.5	16
Constipation/bowel cleanout	71	8.0	7.0–10.0	23.3	20.8–23.8	9
Postoperative complications	63	5.0	4.0–7.0	18.0	12.0–21.0	16
Sepsis evaluation	58	0.08	0.08–0.16	20.8	19.0–22.8	22
Emesis not otherwise specified	51	0.7	0.3–2.8	13.5	11.5–13.0	22
Viral pneumonia	44	1.9	1.5–2.4	18.8	17.0–21.0	46
Fever of unclear etiology	43	1.7	0.4–3.0	14.0	12.3–19.3	26

IA indicates inpatient admission for care beyond 24 hours.

43%. For all observation patients combined, the need for inpatient admission was 15%. Of the 4189 patients who were treated, 0.3% (N = 14) were discharged to home from the OU and readmitted within 72 hours.

Table 3 lists the 20 observation diagnoses most likely to attain successful 24-hour discharge. One hundred percent of patients with a diagnosis of near drowning were discharged successfully within 24 hours. Urgent blood transfusions/infusions, orthopedic injuries, croup, and closed head injury were discharged successfully from the OU within 24 hours in >95% of cases. These 20 diagnoses represent 64% (2662 of 4189) of all observation patient admissions.

Table 4 portrays the 10 observation diagnoses most likely to require inpatient admission. Patients with hematochezia as a primary diagnosis were most likely (60%) to require inpatient admission for care beyond 24 hours, followed by viral pneumonia and bronchiolitis, with inpatient admission rates of 46% and 43%, respectively. These 10 diagnoses represent 24% (1007 of 4189) of all observation patient admissions.

The initial diagnosis from time of admission to time of discharge changed in 1% of observation patients. This was noted most often in patients who were admitted for a symptom (eg, fever, abdominal pain). Patients admitted for fever of uncertain cause

TABLE 3. Observation Diagnoses That Were Most Likely to Attain Successful Discharge in <24 Hours

Admit Diagnosis	*n*	<24-h Stay, %
Near drowning	22	100
Urgent blood transfusion/infusion	221	98
Allergic reaction	29	97
Orthopedic injury	362	97
Febrile seizure	29	97
Intussusception	27	96
Foreign body aspiration/ingestion	92	96
Toxic ingestion	86	95
Croup	207	95
Closed head injury	289	95
Diabetic ketoacidosis*	27	93
Constipation	71	92
Apparent life-threatening event	37	87
Hyperbilirubinemia	29	86
Aseptic meningitis	27	85
Cellulitis	117	85
Acute gastroenteritis	722	84
Urinary tract infection	81	84
Postoperative complications	63	84
Seizure	98	82
Headache	26	81

* In the patient with known insulin-dependent diabetes.

TABLE 4. Observation Diagnoses That Were Most Likely to Require Inpatient Admission (IA)

Diagnosis	*n*	IA, %
Hematochezia	10	60
Viral pneumonia	44	46
Bronchiolitis	212	43*
Ventriculoperitoneal shunt issues	10	40
Bacterial pneumonia	92	30
Abdominal pain	199	27
Fever not otherwise specified	43	26
Cyclic vomiting	12	25
Sepsis evaluation	58	22
Asthma	327	22

* Sixty percent if ≤30 days of age.

received a diagnosis of a specific disorder during their OU stay in 12% of cases. These diagnoses included Kawasaki's disease, retropharyngeal abscess, lymphadenitis, and bacteremia. In 4% of patients initially admitted for abdominal pain, a clear cause was ascertained. Four (2%) of 199 patients with abdominal pain that was deemed nonsurgical on initial evaluation in the ED required surgery, 2 for appendicitis and 2 for cholecystitis. One patient who was admitted for abdominal pain had an undiagnosed bacterial pneumonia, and another proved to have an intra-abdominal hematoma from a bicycle accident 2 weeks before admission. Five (6.2%) of 81 patients who were admitted for urinary tract infection had differing discharge diagnoses, such as bacterial pneumonia, appendicitis, and Kawasaki's disease. Of the 51 patients who were admitted for vomiting of uncertain cause, 2 (3.9%) had pyloric stenosis. Three (1.4%) of the 207 patients with the initial diagnosis of croup had tracheitis, requiring transfer to the pediatric intensive care unit.

The rate of inpatient admission among all observation patients increased with decreasing age ($P < .001$). Infants who were aged ≤30 days had the highest rate of inpatient admission at 25%. This group had an RR for inpatient admission of 1.9 (95% CI: 1.4–2.6) when compared with children who were >30 days of age. The effect of age on rate of inpatient admission was also analyzed by diagnosis. Patient age was associated with the need for inpatient admission in only 2 diagnoses: bronchiolitis and abdominal pain. Among bronchiolitis patients, age ≤1 month was associated with higher inpatient admission rate (60% ≤1 month vs 38% >1 month; $P < .005$). These infants had an RR for inpatient admission of 2.5 (95% CI: 1.3–4.8) when compared with all observation patients. Among patients with abdominal pain, age >12 years was associated with a higher inpatient admission rate (22% ≤12 years vs 41% >12 years; $P < .025$). These older patients had an RR for inpatient admission of 2.5 (95% CI: 1.3–5.0) when compared with all observation patients.

Scheduled Procedure Patients (*N* = 2288)

There were 2288 (35%) OU admissions for scheduled procedures. All of these patients were admitted directly to the OU without an ED visit. Data for the 10 most common scheduled procedure diagnoses are shown in Table 5. The most frequent need for scheduled admission was procedural sedation ($n = 1295$). Sedation was usually administered to facilitate procedures such as lumbar puncture and bone marrow biopsy, peripherally inserted central catheter placement, or auditory brainstem response studies. Median LOS for the 10 most common scheduled proce-

TABLE 5. The 10 Most Frequently Scheduled Procedure Diagnoses

Diagnosis	*n*	Age, y		LOS, h		IA, %
		Median	95% CI	Median	95% CI	
Sedation for procedure*	1295	5.0	4.0–5.0	1.3	1.3–1.5	0.1
pH probe	199	1.9	1.6–2.8	23.8	23.8–24.0	2
Infusion (eg, intravenous immunoglobulin, Remicade)	194	12.0	12.0–15.0	5.4	5.0–5.8	1
Biopsy (eg, renal, liver, bowel, eye)	137	11.0	9.0–13.0	22.2	21.8–23.0	9
CCTV/EEG†	104	7.5	6.0–10.0	22.3	21.8–22.5	0
Intrathecal baclofen trial	81	9.0	8.0–12.0	7.3	7.3–7.8	1
Orthopedic procedure	58	11.0	8.0–12.0	19.4	18.3–21.5	0
Percutaneous endoscopic gastrostomy	44	1.9	1.2–3.0	24.0	23.8–24.0	5
Sleep study	20	3.5	1.9–8.0	9.8	9.3–12.0	0
Post cardiac catheterization	19	6.0	1.2–14.0	5.8	4.3–6.5	5

IA indicates inpatient admission for care beyond 24 hours.
* Simple procedures such as lumbar puncture or bone marrow aspirate.
† Closed-circuit television electroencephalography.

dures ranged from 1.3 hours for patients who needed procedural sedation to 24 hours for patients who underwent observation after placement of a percutaneous endoscopic gastrostomy device. The 10 diagnoses listed in Table 5 comprised 94% (2151 of 2288) of all patients admitted to the OU for scheduled procedures.

For the scheduled procedure population as a whole, 99% were discharged successfully within 24 hours. Age was associated with the need for care beyond 24 hours ($P < .001$). Specifically, for patients who were ≤30 days of age, the rate of inpatient admission was 14.3%, with an RR for inpatient admission of 13.9 (95% CI: 3.0–65.0) compared with scheduled procedure patients older than 30 days.

DISCUSSION

The OU at PCMC plays an important role in the treatment of sick children by providing care for patients who are too ill for safe discharge from the ED and by providing a "safety net" for ongoing evaluation of disease processes. Pediatric OU beds were used for patients with a wide variety of acute medical and surgical conditions, as well as those who required scheduled procedures. The median age, LOS, and successful discharge rate for the 4189 observation patients admitted to the OU differed significantly from the 2288 admitted for elective procedures. Although this finding was expected, given the different reasons for OU admission, it confirmed the need to analyze these 2 groups separately.

The combination of observation patients and scheduled procedure patients likely benefited the operation of the study OU. Ross et al[11] reported that sharing an OU with scheduled procedure patients would maintain a more consistent unit census and patient/nurse ratio. On the basis of this analysis and anecdotal experience (time of admission not being collected), this seems to be true. Scheduled procedure patients stabilize OU census throughout the day, because they are usually admitted during midmorning hours and discharged in the afternoon after a median LOS of 3.0 hours. The observation patients (the bulk of OU admissions) are more likely to be admitted during the late afternoon and evening hours, when the ED is busiest and when elective procedures are less frequently being performed. The majority of these children can be discharged the next morning, freeing beds for scheduled procedure patients.

The overall rate of successful discharge (85%) for observation patients measured in this investigation falls within suggested guidelines[2] but is less than rates described in previous reports from pediatric OUs in North America,[15,16] Australia,[17] and Singapore.[18] This may be attributable, in part, to the use of less conservative admission criteria in the study OU, allowing the admission of patients who are more ill. Indirect support for this exists, because the number of observation patients who were admitted to the study OU (580 per 10 000 ED visits) was greater than that reported at similar facilities (545/10 000 in Australia[17] and 400/10 000 in Hartford, CT[16]). The median age and LOS data for our study population are comparable to previously published reports on pediatric OUs.[15,19] Many of the most common observation diagnoses (asthma, dehydration) treated in the study OU were similar to those seen in pediatric OUs located elsewhere (Connecticut,[15,16] Australia,[17] and New Zealand[19]). However, patients with orthopedic injuries and abdominal pain seem to be treated more frequently in the study OU. Table 6 depicts the most common observation diagnoses encountered at several geographically diverse pediatric OUs (adapted from Wiley[16]).

More than 93% of observation patients were initially evaluated in the adjacent pediatric ED. These OU patients represent approximately one third of admissions from the ED to all hospital areas (OU, traditional ward, and intensive care units). Only 7% of observation patients were admitted directly to the OU, without an ED evaluation. These patients had diagnoses that were not amenable to treatment during a brief ED stay but were likely to require <24 hours of medical care. Direct admissions are less frequent than admissions from the ED because admitting patients directly to the OU without first attempting to improve their condition could lead to an unnecessary OU stay.

The patient volume per month data presented in Fig 2 reveal several interesting relationships. The upward slope of the bottom line, representing the overall number of OU admissions, reflects the 31% increase in patient volume from the first to second years of unit operation, whereas ED visits rose only 17% during this period. Some of the increase in OU volume may be attributed to the increased number of patients who were referred for direct OU admission by outpatient clinic physicians. Figure 2 also demonstrates the typical large increases in ED visit volume and hospital inpatient admissions during the winter months. OU admissions did not demonstrate this seasonal variation. Future studies of admission diagnosis patterns may clarify reasons for this finding.

Patients with the admission diagnoses listed in Table 3 had the highest rates of successful discharge

TABLE 6. Most Common Observation Admission Diagnoses in Different, Geographically Separated OUs

Diagnosis Rank	Salt Lake City	New Zealand[19]	Hartford, CT[20]	Australia[21]
1	Gastroenteritis/dehydration	Respiratory Infection	Asthma	Asthma
2	Orthopedic injury	Asthma	Gastroenteritis/dehydration	Ingestion
3	Asthma	Ingestion	Seizure	Nonrespiratory infection
4	Closed head injury	Gastroenteritis/dehydration	Closed head injury	Seizure
5	Urgent transfusion	Seizure	Ingestion	Respiratory infection

Adapted from Wiley.[16]

within 24 hours and therefore represent patients who seem most suitable for treatment in an OU setting. Hospitals that are anticipating building an OU with pediatric capabilities might consider these data to predict anticipated patient volume. Several diagnoses in this list, such as hyperbilirubinemia of the newborn, aseptic meningitis, and diabetic ketoacidosis in the individual with known diabetes, have not been previously reported in the pediatric OU literature. Successful 24-hour discharge rates for these diagnoses ranged from 85% to 93%.

Patients with certain diagnoses may not be ideal candidates for admission to an OU. The American College of Emergency Physicians has advised, "Patients who subsequently are admitted to the hospital (from the OU) should be examined to identify if their period of observation was appropriate. If the number of admitted patients is high (>30%), the department has to question the validity of the unit's guidelines."[2] On the basis of this consensus statement, hematochezia, viral pneumonia, bronchiolitis, and ventriculoperitoneal shunt problems may be better treated in an inpatient setting. These diagnoses are now routinely discouraged for admission to our OU.

We evaluated age and its relationship to OU disposition to ascertain whether it is appropriate to exclude certain age groups from the OU. It is has been suggested that neonates may not be appropriate for a pediatric OU.[1] Although observation patients who were <30 days of age had a higher rate of inpatient admission when compared with children who were >30 days of age, their overall rate of successful discharge was still 75%. However, our data did show that almost two thirds of bronchiolitis patients who were under 1 month of age required inpatient admission. As a result, these patients are no longer admitted to our OU. Also, children >12 years of age presenting with abdominal pain of uncertain etiology are considered carefully before admission to our OU, because of their increased need for inpatient admission (41%).

According to the American College of Emergency Physicians, "an active observation program can lower risk of malpractice by reducing the physician's chance of inadvertently sending home a patient with a serious, life-threatening disease."[2] OU admission diagnosis for the observation population changed or evolved in 1% of patients. Although this is a low percentage, some of the new diagnoses (eg, bacterial tracheitis) were life-threatening.

The study OU was an appropriate setting for patients requiring procedures such as closed-circuit television electroencephalography, pH probe testing, or procedural sedation, based on the low inpatient admission rates recorded. Overall, only 1% of scheduled procedure patients required subsequent inpatient admission, although a higher rate of admission (14%) in patients who were aged ≤30 days was noted. LOS had a bimodal distribution, with 5 of the 10 most common procedures having LOS under 10 hours and 5 having values >19 hours. Procedures with longer LOS were generally those that required prolonged postprocedure observation secondary to concerns of bleeding (eg, biopsy, percutaneous endoscopic gastrostomy device placement) or because the procedure itself was designed to measure data (eg, esophageal pH, seizure activity) for a full day.

Limitations

Limitations of this study include its retrospective design, although the type of information gathered (diagnosis, LOS) was usually well documented. Interobserver variability was minimized by having only 1 individual, the principal investigator (who was an attending physician working in the OU), extract information from all 6477 charts. Patients who were admitted to the OU, discharged from the hospital, and then readmitted to another hospital could have been unknowingly included in the successfully discharged group. The likelihood of this occurring is diminished by the absence of pediatric inpatient beds at most of the hospitals in the geographic region served by PCMC. Other limitations include the lack of available data regarding patient selection and their subsequent management in the OU. We are currently studying OU patients with specific diagnoses such as gastroenteritis,[22] closed head injury,[23] asthma,[24] hyperbilirubinemia,[25] toxic ingestions,[26] and cellulitis in an effort to better define the predictors for inability to discharge these patients successfully within 24 hours. A recent study regarding community physician satisfaction with the OU at PCMC has been reported.[27] Additional investigations of the OU's effects on hospital costs, medical outcomes, admission patterns, hospital bed availability, and patient/parent satisfaction would also be useful to further delineate the future role of pediatric OUs in our health care system.

CONCLUSIONS

Our pediatric hybrid OU played an important role in the treatment of children admitted for observation as a result of acute illness or injury, as well as children who required scheduled procedures. For both patient types, we identified diagnoses that were most and least likely to attain successful discharge within 24 hours. The majority (85%) of observation patients were discharged successfully within 24 hours. Successful discharge rates for diagnoses not commonly managed in other pediatric OUs were reported. We identified certain age groups within selected diagnoses that may not have been appropriate for the OU.

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