Pediatric Emergency Department Use by Adults With Chronic Pediatric Disorders

William M. McDonnell, MD, JD; Irene Kocolas, MD; Genie E. Roosevelt, MD, MPH; Angela T. Yetman, MD

Objective: To describe pediatric emergency department use by adults with chronic pediatric disorders, known as transition patients.

Design: Retrospective descriptive study.

Setting: The pediatric emergency department of a tertiary care pediatric hospital during calendar year 2005.

Participants: All patients presenting to the pediatric emergency department during the study period.

Main Outcome Measures: Association of presenting complaint with the patient's chronic pediatric disorder, emergency department interventions and dispositions, and duration of inpatient admissions.

Results: Patient encounters totaled 43,621, with 445 (1%) involving adult patients. Transition patients accounted for 197 (44%) of the adult encounters. Eighty-nine transition patient encounters (45%) were for complaints unrelated to the patients' chronic pediatric disorders. Only 14 (7%) transition patient visits did not involve diagnostic studies or procedures. Transition patients were 2.1 times (95% confidence interval, 1.8-2.5; \( P < .001 \)) more likely to require admission than pediatric patients and were 4.5 times (95% confidence interval, 3.3-6.1; \( P < .001 \)) more likely to require intensive care. Median length of stay for admitted transition patients was 4 days (range, 1-35 days) compared with 2 days (range, 1-80 days) for pediatric patients (\( P < .001 \)).

Conclusions: A substantial number of adult patients with chronic pediatric disorders use the pediatric emergency department and often present with complaints unrelated to their pediatric conditions. They have high rates of hospital and intensive care unit admissions. Pediatric hospitals should be prepared with adequate resources and training to deal with these complex adult patients.


Advances in medical technology have markedly improved the survival of children with previously fatal medical conditions. As a result, increasing numbers of pediatric patients with chronic medical disorders are surviving into adulthood.\(^1\)\(^-\)\(^4\) This new cohort of adult “transition patients” presents challenges to the individual physicians who care for them\(^5\)\(^,\)\(^6\) and to the medical system as a whole.\(^1\)\(^,\)\(^2\) As policymakers struggle with reforming the American health care financing and delivery systems, it will be important to consider these challenges.

Young adults with chronic childhood illnesses are typically familiar with pediatric health care delivery systems. They generally have extensive experience with pediatricians, pediatric hospital facilities, and other pediatric medical services. Their relationships with pediatricians and pediatric subspecialists often continue into adulthood.\(^5\)\(^,\)\(^7\)\(^-\)\(^10\) With this experience and familiarity, these adult patients may choose to seek medical attention for their acute medical problems in a pediatric emergency department (PED). Unlike transition patient outpatient encounters in pediatric subspecialty clinics, PED visits may be more likely to involve issues not directly related to the patient’s underlying chronic pediatric disorder.\(^5\)\(^-\)\(^13\)

For editorial comment see page 581

The demands that transition patients currently place on PEDs are poorly understood. Older studies have shown that substantial numbers of adult patients use PEDs for a host of reasons.\(^1\)\(^,\)\(^13\) In addition to transition patients, adult PED patients may also include adults without chronic pediatric disorders or relationships with the pediatric health care system.\(^1\)\(^,\)\(^14\) Some adults may seek care in the PED because of confusion over its nature as a pediatric facility or because of injury or onset of illness while visiting or work-
ing in the pediatric hospital.12,13 All types of adult patients may pose particular challenges to PED providers and their hospitals and have prompted specific changes in the training curriculum for pediatric emergency physicians.14,15 However, if large numbers of transition patients use PEDs for their acute adult disorders or for problems arising from their chronic pediatric disorders, they may impose a distinct set of training and resource burdens on PEDs, their physicians, and their hospitals.

Numerous researchers and policymakers are working to determine and to encourage the best means of providing transition patients with appropriate emergency medical care. However, until they have a clear picture of the current use of the PED, it will be difficult for them to support adequately such use or to advocate convincingly for alternative emergency care delivery systems. Therefore, we sought to evaluate the use of PEDs by adults with chronic pediatric disorders and to consider the demands for resources that they place on PEDs and pediatric hospitals.

We designed a retrospective descriptive study to describe transition patient use of the PED at a pediatric specialty hospital. Data were collected at the Primary Children's Medical Center (PCMC) in Salt Lake City, Utah. The PCMC is an urban, tertiary care, free-standing pediatric hospital with an annual PED volume of more than 43,000 patient encounters. During the study period, 54% of PCMC PED patients had private health insurance, 36% had public insurance (primarily through Medicaid and the Children's Health Insurance Program), and 10% were uninsured. Seventy-six percent of PCMC PED patients were white; 14% were Hispanic; 2% were black; and 8% were other, unknown, or not identified. The PCMC is owned and operated by Intermountain Healthcare, a nonprofit health care system, and is affiliated with the University of Utah School of Medicine. The PCMC is located on the same medical complex campus as, and in close proximity to, the University of Utah Hospital, which operates a general ED and provides an alternative source of emergency medical care in the immediate vicinity of PCMC.

We performed a retrospective review of PCMC PED admissions data and a medical record review of adult PED patients for the 12-month period ending December 31, 2005. From the PED computerized LOGICARE patient-tracking system (LOGICARE Corp, Eau Claire, Wisconsin), we identified all patient encounters for adult patients, defined as patients aged 19 years or older on the date of PED presentation. During the study period, 54% of PCMC PED patients had private health insurance, 36% had public insurance (primarily through Medicaid and the Children's Health Insurance Program), and 10% were uninsured. Seventy-six percent of PCMC PED patients were white; 14% were Hispanic; 2% were black; and 8% were other, unknown, or not identified. The PCMC is owned and operated by Intermountain Healthcare, a nonprofit health care system, and is affiliated with the University of Utah School of Medicine. The PCMC is located on the same medical complex campus as, and in close proximity to, the University of Utah Hospital, which operates a general ED and provides an alternative source of emergency medical care in the immediate vicinity of PCMC.

We also sought to determine whether the presenting complaints and diagnoses of transition patients fell within the usual training curriculum of PED physicians. The presenting complaints and discharge diagnoses of the study population were compared with the curriculum on which the American Board of Pediatrics Subboard of Pediatric Emergency Medicine bases certification in pediatric emergency medicine.20 Categorical variables are presented as frequencies. Continuous variables are reported as medians with ranges, as their distributions were found to be nonnormal. These nonnormal continuous variables were compared using the Mann-Whitney U test. Relative risks and 95% confidence intervals (CIs) were calculated. Calculations were performed using SPSS for Windows, version 17.0 (SPSS Inc, Chicago, Illinois). We obtained approval from the University of Utah institutional review board prior to beginning this study.

RESULTS

PED EVALUATION AND TREATMENT

The study institution’s PED provided 43,261 patient evaluations during the 1-year study period. The PED cared for adult patients in 445 (1%) of the patient encounters during this period. Of this group of 445 adult patient visits, 197 (44%) were for transition patients with chronic pediatric disorders. One hundred thirteen transition patients accounted for these 197 visits during the study period. Median patient age at the time of visit was 20 years, with a range of 19 to 37 years (interquartile range, 19-22 years). Fifty-four (48%) transition patients were men. The median number of PED encounters per transition patient was 1, with a range of 1 to 9 (Table 1). Thirty-eight patients (34%) had more than 1 visit.
The PED evaluation and treatment of transition patients required consultation with at least 1 pediatric subspecialty service in 169 visits (86%). Physicians in the PED consulted 2 subspecialty services on 25 (13%) occasions, and 3 or more subspecialty services for 17 (9%) transition patient encounters. Only 14 (7%) transition patient PED visits did not involve radiographic studies, laboratory tests, or medical or surgical procedures.

### HOSPITAL ADMISSIONS

Eighty-four (43%) transition patient encounters required hospital admission. Three (4%) were transferred to another facility for admission to an adult service. The remaining 81 (96%) of these patients were admitted to the pediatric hospital, resulting in a transition patient admission rate to the pediatric hospital of 42%. In contrast, the overall admission rate for all PED patients younger than 19 years to the pediatric hospital was 20% (n=8593) during the study year. Accordingly, transition patients were 2.1 times (95% CI, 1.8-2.5; P < .001) more likely to require admission than pediatric patients. Transition patients’ median length of hospital stay was 4 days (range, 1-35 days), while the median length of hospital stay for pediatric patients was 2 days (range, 1-80 days; P < .001). The combined cumulative inpatient days for transition patients presenting to the PED during the 1-year study period totaled 451 days.

Twenty-eight transition patients seen in the PED were admitted directly to the pediatric intensive care unit (ICU), resulting in an ICU admission rate of 35% among transition patients who required admission to the hospital. In comparison, the ICU admission rate from the PED for all admitted pediatric patients during the study period was 8% (n=663). Of those patients who required hospital admission, transition patients were 4.5 times (95% CI, 3.3-6.1; P < .001) more likely to require ICU admission than pediatric patients. Transition patients’ median length of ICU stay was 5 days (range, 1-35 days), compared with a median of 4 days (range, 1-80 days) for pediatric patients’ ICU stays (P = .048).

Among the 53 transition patients admitted to services other than the ICU, 26 (49%) were admitted to the neurosurgery service, 14 (26%) to the cardiology service, 8 (15%) to the oncology service, 2 (4%) to the orthopedics service, and the remaining 3 (6%) to the pediatric medical service.
PEDiatric EMERGENCY PHYSICIAN TRAINING

All PED attending physicians at the subject institution were board certified in pediatrics, fellowship trained in pediatric emergency medicine, and board certified or board eligible in pediatric emergency medicine. When compared with the American Board of Pediatrics certifying curriculum in pediatric emergency medicine, 194 (98%) transition patients’ presenting complaints to the PED and diagnoses were included within the PED physicians’ prescribed training curriculum. The remaining 3 (2%) patients’ presenting medical conditions included acute abdominal pain in the setting of pregnancy, acute gout, and a femoral artery pseudoaneurysm.

Appropriate use of health care services by patients and prudent allocation of resources by policymakers and administrators have become increasingly important in the current era of escalating health care costs, shortages of health care resources, and political pressures to reform health care financing and delivery. Previous studies found that transition and acute adult patients together comprised 0.9% to 4.0% of all patients in the PED.11-13 With the finding that 1% of PED visits were for adult patients, our study demonstrates that substantial numbers of adults, and particularly adult transition patients, continue to use the PED.

Our findings regarding actual use prompt the important and related questions of where adults with chronic pediatric disorders should receive their acute medical care, and what resources should be committed to providing that care. Transition patients’ chronic pediatric disorders may be unfamiliar to adult-care physicians, yet their acute conditions may involve areas of adult medicine unfamiliar to pediatric physicians.9 As increasing numbers of children with chronic pediatric disorders survive into adulthood, answers to these questions will take on increasing urgency. Appropriately, a number of investigators and policymakers are seeking to address these questions. For example, the Maternal and Child Health Bureau of the US Department of Health and Human Services has identified as a priority in its National Agenda for Children With Special Health Care Needs the goal that “All youth with special health care needs will receive the services necessary to make appropriate transitions to adult health care.”21

Transition patients in our study showed a clear tendency to continue using the pediatric health care delivery system despite reaching adulthood. More than three-quarters of these transition patients continue to receive outpatient care from at least 1 pediatric physician. Most of the transition patients in our study who do not have a primary care provider do have a relationship with a pediatric subspecialist, suggesting that many transition patients may receive outpatient care exclusively from pediatric physicians. While it may not be surprising that patients with close relationships with the pediatric care system would seek acute care in the PED, it is remarkable that even the inpatient hospital care arising from their PED visits is overwhelmingly provided by the pediatric hospital.

Our data indicate that transition patients demand substantial and increasing resources in the pediatric outpatient clinic, ED, and inpatient settings. Not only do transition patients continue to use the pediatric health care system in the outpatient setting, but when they present to the PED, they are more likely than other patients to require hospital admission, and more likely to require ICU care, and have longer inpatient and ICU hospital stays.

Pediatric EDs and their pediatric hospitals must be equipped with the expertise to address exacerbations of chronic pediatric disorders as well as acute adult medical problems in these patients. Pediatric hospitals must be prepared for issues ranging from those as mundane as beds large enough for adults to those as complex as adult resuscitation and treatment protocols.

It appears that current pediatric emergency medicine training and certification have appropriately evolved to manage transition patients. The structure of the pediatric emergency medicine curriculum has become standardized,22 incorporates specific training in adult medicine,19 and includes nearly all of the presenting conditions and diagnoses of the transition patients in our study. Board-certified pediatric emergency medicine physicians appear to be prepared to address most conditions that adults with chronic pediatric disorders present. Nonetheless, PED patient populations and their associated medical conditions may continue to evolve and may necessitate training modifications in the future.

There are limitations of our study, which should be identified to properly interpret the data presented. First, our study is retrospective. Existing hospital admissions data and patient records made it possible to efficiently analyze a large patient population and to gain an initial understanding of PED use by transition patients. However, future studies might provide a more comprehensive picture by prospectively evaluating transition patients’ health care use patterns and medical outcomes. Second, we obtained our data from a single tertiary care pediatric hospital. The generalizability of our conclusions may be limited by differing care use patterns, PED practice styles, and admitting practices across various geographic areas. Future studies in other geographic regions and in other health care systems may add to our understanding. Moreover, there may be particular factors within the care system at PCMC that encourage transition patients to use the PED to a greater or lesser extent than at other pediatric hospitals. For example, there is no fixed age limit for PCMC specialty clinics or for tran-
tion patient hospital admissions. Additionally, PCMC and the University of Utah together have developed a formal transition program for patients with cystic fibrosis. Nevertheless, the findings from our center should now prompt careful consideration of the challenges that transition patients pose to pediatric hospitals in all regions of the United States.

Our objective was to describe use of the PED by transition adult patients. A detailed investigation of alternative sites where these patients might or should receive their emergency care is beyond the scope of this study. Therefore, we have not attempted to explore potential actions, such as improved primary and specialty care transition programs, that might be taken to reduce (or increase) the use of the PED by adult patients, whether such actions might be effective, and whether such an outcome might be desirable. However, our findings demonstrate the importance of addressing these issues in future studies.

In conclusion, we found that adults with chronic pediatric disorders use the PED in substantial numbers. These patients require a large quantity of diagnostic and treatment resources relative to their numbers. As this cohort of transition patients continues to grow, PEDs should carefully consider how best to provide transition patients with appropriate care. Unless large-scale policy decisions are made to provide acute care for these patients at adult facilities, pediatric hospitals should be prepared with adequate resources and training to deal with these complex adult patients.

Accepted for Publication: December 16, 2009.

Correspondence: William M. McDonnell, MD, JD, Department of Pediatrics, University of Utah, PO Box 581289, Salt Lake City, UT 84158 (william.mcdonnell@hsc.utah.edu).

Author Contributions: Study concept and design: McDonnell and Yetman. Acquisition of data: McDonnell and Yetman. Analysis and interpretation of data: McDonnell, Kocos, and Roosevelt. Drafting of the manuscript: McDonnell, Kocos, and Yetman. Critical revision of the manuscript for important intellectual content: Roosevelt. Statistical analysis: Roosevelt. Study supervision: McDonnell and Yetman.

Financial Disclosure: None reported.

REFERENCES


