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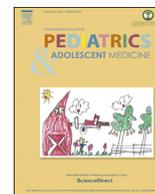
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## Original article

# Factors associated with outpatient follow-up after a pediatric inpatient stay at a community hospital

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US

United States

PCP

primary care physician

OPA

outpatient appointment

ED

emergency department

PICU

pediatric intensive care

ANOVA

Analysis of variance

CF

cystic fibrosis

## ABSTRACT

**Background and objectives:** Pediatric settings often use a patient-centered medical home model in caring for patients in the outpatient setting and for attempting to connect inpatient care with outpatient follow-up. This medical home model has proven to be beneficial in many aspects of patient care, but there needs to be a good transition between inpatient and outpatient services. Our goal in this study is to determine the association of particular variables with adherence to outpatient follow-up after a general inpatient stay, in the pediatric population.

**Methods:** In a retrospective sample of 221 patients, we study the association of variables such as demographics, medical history, hospital discharge and appointments, and caregiver information, with patient adherence to outpatient appointments after discharge from pediatric inpatient treatment.

**Results:** We found that increased length of hospital stay and a non English-speaking caregiver were each associated with increased odds for adherence. Discharge diagnosis of respiratory illness and that of neurology/psychiatry/toxicology were associated with decreased odds for adherence. None of the demographic and medical history variables were associated with adherence.

**Conclusions:** Our findings offer guidance to clinicians for the types of patients who may need closer follow-up and interventions set in place to remind these patients of the importance of attending an outpatient appointment.

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## 1. Introduction

In 2012, there were 5.85 million hospital inpatient stays for children in the United States (US), with an average stay of 3.9 days [1]. The nature of pediatrics is largely preventative, and successful

pediatric patient outcomes often involve the family unit and its relationship with the pediatrician [2]. The current medical climate in the US emphasizes the patient-centered medical home model, with the primary care physician (PCP) directing a comprehensive overall care of the “whole person.” [3] In the pediatric setting, outpatient care is crucial for patient health and well-being. The medical home framework emphasizes a seamless transition between appointments [4]. Research using the medical home model linking inpatient and outpatient care has found improved patient and parent satisfaction, ease of appointment making and subspecialty referrals, quick medical management, and a good

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doctor–patient relationship [5].

There are variables important for understanding adherence to an outpatient appointment (OPA) after inpatient discharge. The demographic variable, young age, was associated with increased OPA adherence after emergency department (ED) discharge [6]. Medical history is important for understanding adherence to an OPA, as those with acute infectious respiratory illnesses had higher adherence to an OPA than those who had non-acute established illnesses after an ED visit [6]. Although not studied in pediatric samples, an adult study found that patients with a psychiatric history or a history of tobacco use were less adherent to outpatient appointments [7].

Hospital discharge variables are also important for understanding adherence to an OPA, as more severe medical illnesses benefit most from a medical home model [5]. However, in one pediatric study, higher peak pediatric risk of mortality score, longer pediatric intensive care (PICU) stay, and longer hospital stay were predictors of non-adherence to an OPA after hospital discharge [8]. With regard to appointments made at discharge, adherence to an OPA was higher for patients receiving clear discharge instructions than those who were simply asked to follow-up with their PCPs [6]. Scheduled appointments after PICU stay were also better attended than just recommended appointments. However, increased number of follow-up appointments given after PICU stay was associated with decreased non-adherence to an OPA [8].

There are mixed findings with regard to the role of caregivers. One study reported that being a single mother was associated with better adherence to an OPA [9]. However, another study reported that the number of caregivers was not associated with outpatient adherence to an OPA [8].

There are a limited number of studies with pediatric patients that evaluate variables associated with an OPA [6,8]. These studies are conducted with PICU patients and ED patients with respiratory complaints. We are not aware of any studies for adherence to an OPA after a general inpatient stay in a pediatric sample. We use univariate and multivariate analyses to study demographic, medical history, hospital discharge and appointments, caregiver information, and other variables to determine the association of these variables with adherence to an OPA after a general inpatient stay.

## 2. Methods

### 2.1. Participants and setting

This retrospective study included 221 consecutive patients admitted to the pediatric inpatient unit at a community medical center in suburban New York City serving mostly low-to middle-income patients. Patients were those discharged from the general inpatient unit. Data were collected from those who were admitted from August 2015 to February 2016. Inclusion criteria were all children of age 0 through 17 years who were treated in the pediatric inpatient unit and who had primary follow-up in our affiliated outpatient clinics, with at least one previous outpatient appointment at our primary or subspecialty clinic within 2 years before an inpatient visit, or those who were instructed to follow-up at our primary or subspecialty clinic owing to lack of an established outpatient provider. Exclusion criteria were patients who were 18 years or older and those who had established primary care providers outside of our affiliated outpatient clinics.

### 2.2. Variables

**Demographics:** Variables were child age (years), sex (female/male), race/ethnicity (white, black, and Asian/other), and Hispanic ethnicity as presumed from the patient name.

**Medical History:** Variables measured as no/yes were asthma, sickle cell or hematologic disorder, psychiatric diagnosis, surgery, seizure, developmental disorder/learning disability, alcohol use, drug use, and other chronic disease.

**Hospital Discharge:** Variables were severity of presenting illness (triage score of 1 = most severe to 5 = least severe) [10] and length of hospital stay (days). We also recorded as no/yes pending laboratory studies, pending imaging, medication prescribed at discharge, and discharge diagnosis (trauma, bacterial infection, viral infection, respiratory, gastrointestinal, neurology/psychiatry/toxicology, hematology/oncology, or others).

**Appointments:** Healthcare practitioner appointment variables included appointments made at discharge (no/yes), number of appointments, patient referral at discharge (no/yes), and instructions noted on discharge papers or specific instructions given to make an appointment (no/yes).

**Caregiver:** Variables were primary caregiver type at home (mother, one of the father/grandparent/aunt/uncle/others, or both mother and father), adult caregivers at home (number), and caregiver language (English or no English).

**Miscellaneous:** Other variables included children in the family (no/yes), health insurance (Medicaid vs. private/self-pay/other), and previous outpatient care in the hospital system (no/yes).

**Outcome:** The outcome variable was adherence to a medical OPA within 30 days after inpatient discharge (no/yes).

### 2.3. Statistical analysis

Continuous variables are represented as mean and standard deviation, whereas categorical variables are represented as percentage and frequency. Inferential analyses were used to compare variables with OPA adherence. Analysis of variance (ANOVA) was used to analyze the normally distributed continuous variables and the Mann–Whitney test was used to analyze the skewed continuous variables. The Pearson chi-square test was used to compare the categorical variables except when any cell was less than 5, wherein Fisher's exact test was used. All comparisons that were statistically significant in the univariate analyses were included in a multivariate logistic regression analysis, with OPA adherence as the outcome variable. All p-values were two-tailed. IBM SPSS Statistics Version 23 was used for all analyses [11].

## 3. Results

Fig. 1 shows that almost three-quarters of patients adhered to an OPA within 30 days after hospital discharge. Mean age was almost 8

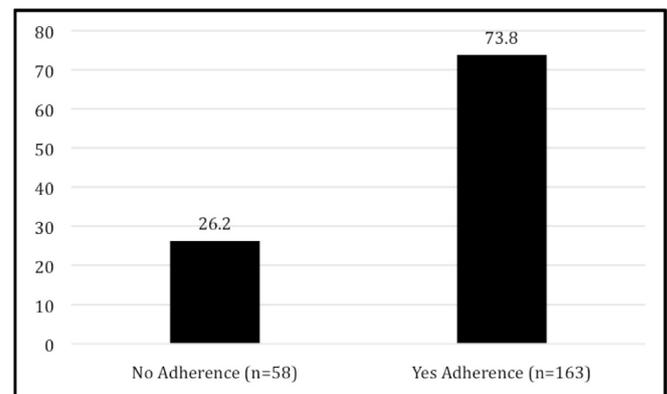


Fig. 1. Percentage for adherence to attending an outpatient appointment within 30 days after discharge from hospital.

years, and slightly more than half were male. The sample had minority representation; more than one-quarter of them were black and almost half of them were Hispanic. None of the demographic variables showed any difference between those who did and those who did not adhere to an OPA (Table 1).

With regard to medical history, the variables of asthma, surgery, and developmental disorder/learning disability, each had more than a 10% adherence rate. All the other medical history variables were below a 10% adherence rate. None of the medical history variables showed difference between those who did and those who did not adhere to an OPA (Table 1).

With regard to hospital and discharge, triage level 3 was most common, and more than three-quarters of admitted patients had this level; none had triage level 1. Almost half had medications prescribed at hospital discharge. 5% or less of patients had pending laboratory or imaging at time of discharge. Length of stay showed a statistically significant difference, wherein those who were adherent to an OPA had greater mean length of hospital stay than those who were nonadherent. Discharge diagnosis showed statistically significant difference, where the pattern suggested that those with respiratory and those with neurology/psychiatry/toxicology diagnoses had low percentages of adherence to an OPA relative to other medical diagnoses (Table 2).

With regard to appointment variables, two-thirds had an appointment made by the healthcare practitioner at discharge. The mean number of appointments made was almost 1. Almost three-quarters of them had instructions for an appointment, if no actual appointment was made. Almost 100% had documentation that instructions were provided regarding an appointment at discharge. Although only 2 individuals did not have this information documented, they did have an appointment made by a healthcare practitioner. None of the appointment variables showed difference between those who did and those who did not adhere to an OPA (Table 2).

With regard to caregiver variables, almost three-quarters of children only had mother as the primary caregiver at home listed in the records. The mean number of caregivers at home was 2. With regard to caregiver language, those who did not speak English showed statistically significant difference, in that they had a greater percentage of adherence to an OPA compared to those who spoke English (Table 2).

With regard to miscellaneous variables, the mean number of

children in the family was slightly more than 2. More than half of them had Medicaid health insurance. Slightly more than half had previous outpatient care in our hospital system in the past 2 years. None of the miscellaneous variables showed a difference between those who did and those who did not adhere to an OPA (Table 2).

The multivariate logistic regression analysis for adherence to an OPA showed that increased length of hospital stay and caregiver not speaking English were each showed statistically significant association with increased odds for adherence. Discharge diagnosis of respiratory illness and that of neurology/psychiatry/toxicology showed statistically significant association with decreased odds for adherence (Table 3).

#### 4. Discussion

We found that an increased length of hospital stay and caregivers for whom English was not a primary language were each associated with increased odds for adherence to an OPA. Discharge diagnosis of respiratory illness and that of neurology/psychiatry/toxicology were each associated with decreased odds for adherence to OPA. No other variables were associated with adherence to an OPA.

Length of hospital stay was a significant factor for increased odds for adherence to an OPA. It is possible that a longer hospital stay indicates a more serious diagnosis. A more severe illness may prompt closer outpatient follow-up, and patients and caregivers may be less comfortable dealing with such a medical diagnosis on their own. However, one prior study found that a longer PICU stay was a predictor of non-adherence to recommended outpatient follow-up [8]. This finding differs from that obtained in our study. A possible explanation is that PICU patients are more likely to have chronic medical illnesses that their families and doctors have been dealing with for some time, which may not reflect those patients with routine acute medical conditions on a general pediatric ward that our study investigates.

We found that non-English-speaking families were more likely to adhere to recommended OPAs. However, previous research shows that non-Hispanic and English speakers had greater trust in their physicians than Spanish-speaking families in an Emergency Department [12]. It is possible that our study differs because trust is a different construct than adherence to an OPA, and non-English-speaking patients may not have the same experience or level of

**Table 1**  
Demographic and medical history comparisons for adherence to attending an appointment within 30 days after discharge from hospital.

| Variable                                   | Whole sample M (SD) or % (Frequency)<br>(n = 221) | No Adherence M (SD) or % (Frequency)<br>(n = 58) | Yes Adherence M (SD) or % (Frequency)<br>(n = 163) | P<br>value |
|--|---|--|--|------------|
| <i>Demographics</i>                        |   |  |  |            |
| Age (years)                                | 7.9 (6.09)  | 9.1 (6.28)                                       | 7.5 (5.98)   | .08        |
| Sex (male)                                 | 58.8 (130)  | 55.2 (32)  | 60.1 (98)  | .51        |
| Race/ethnicity                             |   |  |  | .73        |
| White                                      | 58.8 (130)  | 60.3 (35)  | 58.3 (95)  |            |
| Black                                      | 29.4 (65)   | 25.9 (15)  | 30.7 (50)  |            |
| Asian/Other                                | 11.8 (26)   | 13.8 (8)   | 11.0 (18)  |            |
| Hispanic                                   | 46.6 (103)  | 41.4 (24)  | 48.5 (79)  | .35        |
| <i>Medical History</i>                     |   |  |  |            |
| Asthma                                     | 15.4 (34)   | 19.0 (11)  | 14.1 (23)  | .38        |
| Sickle Cell or Hematologic Disorder        | 8.6 (19)  | 5.2 (3)  | 9.8 (16)   | .41        |
| Psychiatric Diagnosis                      | 4.5 (10)  | 5.2 (3)  | 4.3 (7)  | .73        |
| Surgery                                    | 12.2 (27)   | 10.3 (6)   | 12.9 (21)  | .61        |
| Seizure                                    | 5.9 (13)  | 10.3 (6)   | 4.3 (7)  | .09        |
| Developmental Disorder/Learning Disability | 17.6 (39)   | 10.3 (6)   | 20.2 (33)  | .09        |
| Alcohol Use                                | 1.8 (4)   | 3.4 (2)  | 1.2 (2)  | .28        |
| Drug Use                                   | 2.3 (5)   | 3.4 (2)  | 1.8 (3)  | .61        |
| Other Chronic Disease                      | 5.9 (13)  | 1.7 (1)  | 7.4 (12)   | .19        |

M = Mean, SD = standard deviation.

**Table 2**

Hospital and discharge, appointment, caregiver, and miscellaneous variable comparisons for adherence to attending an appointment within 30 days after discharge from hospital.

| Variable  | Whole sample M (SD) or % (Frequency) (n = 221) | No Adherence M (SD) or % (Frequency) (n = 58) | Yes Adherence M (SD) or % (Frequency) (n = 163) | P value |
|---|--|---|---|---------|
| <i>Hospital and Discharge</i>   |  |   |   |         |
| Severity of Presenting Illness  |  |   |   | .43     |
| Triage 1  | 0.0 (0)  | 0.0 (0)                                       | 0.0 (0)   |         |
| Triage 2  | 7.0 (13)                                       | 10.4 (5)                                      | 5.8 (8)   |         |
| Triage 3  | 83.8 (155)                                     | 83.3 (40)                                     | 83.9 (115)                                      |         |
| Triage 4-5  | 9.2 (17)                                       | 6.3 (3)                                       | 10.2 (14)                                       |         |
| Length of Hospital Stay (days)  | 2.8 (2.22)                                     | 2.2 (1.32)                                    | 3.0 (2.43)                                      | .01     |
| Pending Laboratory  | 4.5 (10)                                       | 1.7 (1)                                       | 5.5 (9)   | .46     |
| Pending Imaging   | 3.6 (8)  | 3.4 (2)                                       | 3.7 (6)   | 1.00    |
| Medication Prescribed at Discharge  | 49.3 (109)                                     | 46.6 (27)                                     | 50.3 (82)                                       | .62     |
| Discharge Diagnosis   |  |   |   | .01     |
| Trauma  | 20.4 (45)                                      | 17.2 (10)                                     | 21.5 (35)                                       |         |
| Bacterial Infection   | 13.1 (29)                                      | 10.3 (6)                                      | 14.1 (23)                                       |         |
| Viral Infection   | 13.1 (29)                                      | 6.9 (4)                                       | 15.3 (25)                                       |         |
| Respiratory   | 8.1 (18)                                       | 15.5 (9)                                      | 5.5 (9)   |         |
| Gastrointestinal  | 14.9 (33)                                      | 12.1 (7)                                      | 16.0 (26)                                       |         |
| Neurology/Psychiatry/Toxicology   | 12.7 (28)                                      | 20.7 (12)                                     | 9.8 (16)  |         |
| Hematology/Oncology   | 10.9 (24)                                      | 5.2 (3)                                       | 12.9 (21)                                       |         |
| Other   | 6.8 (15)                                       | 12.1 (7)                                      | 4.9 (8)   |         |
| <i>Appointment</i>  |  |   |   |         |
| Appointment Made by Healthcare Practitioner at Discharge                            | 68.3 (151)                                     | 60.3 (35)                                     | 71.2 (116)                                      | .13     |
| Number Appointments Made by Healthcare Practitioner at Discharge                    | 0.9 (0.74)                                     | 0.8 (0.70)                                    | 1.0 (0.75)                                      | .12     |
| Patient Referral at Discharge (if no appointment made)                              | 74.7 (165)                                     | 72.4 (42)                                     | 75.5 (123)                                      | .65     |
| Instructions for Appointment on Discharge or Instructions Given to Make Appointment | 99.1 (219)                                     | 100.0 (58)                                    | 98.8 (161)                                      | 1.00    |
| <i>Caregiver</i>  |  |   |   |         |
| Primary Caregiver Type At Home  |  |   |   | .66     |
| Mother  | 71.0 (152)                                     | 75.0 (42)                                     | 69.6 (110)                                      |         |
| One of Father/Grandparent /Aunt/Uncle/Other   | 12.5 (26)                                      | 8.9 (5)                                       | 13.3 (21)                                       |         |
| Both Mother and Father  | 16.8 (36)                                      | 16.1 (9)                                      | 17.1 (27)                                       |         |
| Adult Caregivers At Home  | 2.1 (0.90)                                     | 1.9 (0.71)                                    | 2.2 (0.95)                                      | .12     |
| Caregiver Language  |  |   |   | .01     |
| English   | 62.4 (138)                                     | 77.6 (45)                                     | 57.1 (93)                                       |         |
| No English  | 37.6 (83)                                      | 22.4 (13)                                     | 42.9 (70)                                       |         |
| <i>Miscellaneous</i>  |  |   |   |         |
| Children in Family  | 2.4 (1.18)                                     | 2.5 (1.21)                                    | 2.4 (1.17)                                      | .53     |
| Health Insurance  |  |   |   | .50     |
| Medicaid  | 63.5 (129)                                     | 59.6 (31)                                     | 64.9 (98)                                       |         |
| Private/Self-pay/Other  | 36.5 (74)                                      | 40.4 (21)                                     | 35.1 (53)                                       |         |
| Previous Outpatient Care in Hospital System   | 51.1 (113)                                     | 44.8 (26)                                     | 53.4 (87)                                       | .26     |

M = Mean, SD = standard deviation. Sample size slightly varied for severity of presenting illness (n = 185), caregiver type (n = 214), total adult caregivers (n = 199), children in family (n = 200), and health insurance (n = 203). Discharge diagnosis comparison used Pearson chi-square because of many groups and Fisher's exact test could not be computed. Other Discharge Diagnosis = Genitourinary/Endocrine/Allergy/and other diseases with even smaller numbers.

**Table 3**

Multivariate logistic regression analysis for adherence to attending an appointment within 30 days after discharge from hospital.

| Variable                        | OR (95% CI)       | P value |
|---------------------------------|-------------------|---------|
| Length of Hospital Stay (days)  | 1.31 (1.04, 1.65) | .02     |
| Discharge Diagnosis             |                   |         |
| Trauma                          | 1.00              |         |
| Bacterial Infection             | 0.63 (0.19, 2.13) | .45     |
| Viral Infection                 | 1.52 (0.41, 5.59) | .53     |
| Respiratory                     | 0.24 (0.07, 0.82) | .02     |
| Gastrointestinal                | 0.88 (0.29, 2.73) | .83     |
| Neurology/Psychiatry/Toxicology | 0.30 (0.10, 0.88) | .03     |
| Hematology/Oncology             | 1.85 (0.44, 7.68) | .40     |
| Other                           | 0.27 (0.07, 1.02) | .053    |
| Caregiver Language              |                   |         |
| English                         | 1.00              |         |
| No English                      | 3.00 (1.41, 6.41) | .005    |

OR = odds ratio, CI = confidence interval.

understanding as a result of their language barrier in a short visit with a busy emergency physician compared to their English-speaking counterparts. One can speculate that this finding of OPA adherence in our study stems from the thought that an inpatient

stay is generally longer and more serious than an Emergency Department visit and allows for a more well-defined doctor–patient relationship with non-English-speaking patients, thus laying the groundwork for better adherence.

We found that a discharge diagnosis of respiratory illness and neurology/psychiatry/toxicology were each statistically significantly associated with decreased odds for adherence. Previous research with adults reports that patients with psychiatric diagnoses have a decreased rate of OPA adherence [7]. Our study adds to the literature and indicates that this pattern for psychiatric diagnoses also occurs in pediatric settings. This category of neurology/psychiatry/toxicology includes patients with ongoing issues such as seizures, brain injury or concussions, depression and suicide attempts, eating disorders, and drug addictions or overdoses. It is possible that the majority of the above afflictions are more chronic in nature and may more closely resemble the chronicity of the PICU study, which found that a long PICU stay was a predictor of nonadherence to recommended outpatient follow-up [8].

Established care in a system has mixed findings. While one pediatric study showed that an established PCP or last visit with

PCP had no significant association with attending an OPA [8], established outpatient care in adult studies was noted to have a positive association with adherence to an OPA [13]. Our study is similar to the pediatric study, where we did not find any association between established PCP and adherence to an OPA. It is possible that there is a difference between pediatric and adult adherence. Future research is needed to study this potential difference between pediatric and adult populations.

We did not find any associations of demographic variables with adherence to an OPA. Patient age is often an important demographic variable. For example, previous research in the ED setting found that young age of an adult adversely affected the rate of OPA adherence after discharge from emergency care [14]. Our study finding differs from this finding, in that we focus solely on the pediatric population, whereas this study compared patients of age 18–75 years. It is possible that young adults who have newfound responsibilities for themselves will less likely adhere to OPAs, whereas our patients have adult guardians who were responsible for OPA adherence.

With regard to appointments made at discharge, previous studies suggested that adherence to an OPA was higher for patients receiving clear discharge instructions from the ED than those who were simply asked to follow-up with their PCPs [6], and that scheduled appointments after PICU stay were also better attended than just recommended appointments [8]. However, our inpatient study showed no link between appointment variables and adherence to OPAs. It is possible that a general inpatient stay differs from ED visit or PICU stay. Future research is necessary to clarify this topic.

#### 4.1. Limitations/future research

This study has several limitations. First, when recording follow-up appointments, we did not distinguish between primary versus subspecialty follow-up. We also noted whether a patient attended at least one of the recommended appointments, but we did not record the number of appointments attended. Thus, although we do not report any association between appointments provided and follow-up, it is possible that such an association may have occurred if we had differentiated between appointment attended of subspecialty appointment versus primary care appointment. Future research should study if subspecialty appointments or primary care appointments are more likely to be adhered to or not. Second, we only knew whether a patient followed-up at clinics within our community hospital or related satellite clinics. As electronic medical records were used to determine follow-up, there was no way to determine whether patients had follow-up at a place outside our electronic medical record system, such as established PCPs outside of our network. Third, we gathered data of 221 patients, which is a relatively small number compared to the number of inpatients seen at our community hospital on a yearly basis. There may have been insufficient power to show statistically significant associations for some variables.

Fourth, we combined all those with neurology/psychiatry/toxicology diagnoses into one category and thus are not able to study specific subcategory associations with OPA adherence based on diagnosis and/or age of the patient.

## 5. Conclusions

We found that increased length of hospital stay and a non-English-speaking caregiver were each statistically significantly associated with increased odds for adherence to an OPA. A discharge diagnosis of respiratory illness and neurology/psychiatry/toxicology were each statistically significantly associated with

decreased odds for adherence to an OPA. Our findings offer guidance to clinicians for the types of patients who may need closer follow-up and interventions set in place to remind these patients of the importance of attending an outpatient appointment.

## Conflicts of interest

The authors have no conflicts of interest relevant to this article to disclose.

## Contributor statements

Dr. Jani conceptualized and designed the study, gathered the data, interpreted the data, and drafted the manuscript for important intellectual content.

Dr. Fogel designed the study, analyzed the data, interpreted the data, and critically reviewed and revised the manuscript for important intellectual content.

Dr. Kelly designed the study, interpreted the data, and critically reviewed and revised the manuscript for important intellectual content.

All authors approved the final manuscript.

## Ethics statement

This original research article has been written after the study in question was conducted with integrity. The work has not been plagiarized and is independent and impartial. Patient names and other identifying qualifiers have not been compromised for the sake of this research paper to respect patient confidentiality and ensure anonymity. There was no need for informed consent, as there was no patient participation; the study is a retrospective analysis, in no way affecting patient outcomes.

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The authors have no financial relationships relevant to this article to disclose.

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