Reduction of emergency department visits using an urgent clinic for children with established epilepsy

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Abstract

Background: Emergency department (ED) visits and hospitalizations account for a large portion of the cost of care in people with established epilepsy. In an attempt to decrease seizure-related ED visits, we created an urgent epilepsy clinic (UEC) for children with epilepsy. Our aim was to decrease ED visits for patients seen in the clinic by 30% and decrease unplanned hospitalizations by 10% 3 months following an appointment. **Methods:** Children at risk for an ED visit or unplanned hospitalization were referred and seen by a nurse practitioner and social worker. Factors influencing the need for the appointment and actions taken were recorded. Cost

savings were also calculated. **Results:** A total of 317 patients were seen in the UEC clinic from October 2013 to July 2015. Ninety-three percent of scheduled patients completed their appointment, compared to 84% in other neurology clinics. Eighty-three percent of patients were seen in the clinic within 5 days of the referral. Children were significantly less likely to come to the ED in the 3 months after an appointment compared to the 3 months before. **Conclusions:** An urgent clinic for children with established epilepsy was associated with a reduction in ED visits for seizures and improved adherence to outpatient clinic appointments for seizures. Further research is needed to evaluate the cost-effectiveness of UECs, and to compare health services and clinical outcomes to those of children without access to such services. *Neurol Clin Pract* 2016;6:480-486

Emergency department (ED) visits and unplanned hospitalizations account for a large portion of the cost of care in people with established epilepsy.¹ A 2009 study found the mean total health care costs for children with epilepsy were \$6,379 compared to \$1,032 for children without epilepsy.^{2,3} Children with epilepsy who have a high rate of no-shows and more calls to triage nursing are at high risk for ED visits,⁴ which suggests that failure to access available outpatient care may lead to ED visits and unplanned hospitalizations.

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Epilepsy is an ambulatory care sensitive condition,^{5–9} which means that high-quality outpatient care can help prevent unnecessary ED visits and inpatient admissions. Many of these children can be seen in an urgent care center¹⁰; however, these centers are not staffed by epilepsy specialists or providers who have extensive knowledge in seizure care. Scheduling templates for all neurology providers are usually full as demand is high.

We attempted to decrease ED visits for children with established epilepsy at Nationwide Children's Hospital in Columbus, Ohio, utilizing an urgent epilepsy clinic (UEC) as an initial intervention in a larger quality improvement project. We aimed to decrease ED visits for established epilepsy patients seen in the UEC by 30% 3 months following the clinic appointment with a secondary aim to decrease unplanned hospitalizations by 10%. Finally, we imputed cost savings associated with decreasing ED visits and hospitalizations.

METHODS

Standard protocol approvals, registrations, and patient consents

Institutional review board approval was not required at our institution and written informed consent was not needed as the project was conducted as a quality improvement project. We present our findings based on the Standards for Quality Improvement Reporting Excellence guidelines.^{11,12}

Nationwide Children's is a freestanding pediatric hospital with 427 licensed beds and the sole pediatric tertiary care facility in central Ohio. The outpatient neurology clinic at Nationwide Children's serves over 3,000 children with epilepsy. Epilepsy patients are seen by all 29 neurology physicians with 9 specifically trained in epilepsy care. In addition, 6 advanced practice nurses (APN) and 1 physician assistant provide patient care. The neurology division completes over 7,000 epilepsy-related patient care visits in the outpatient setting each year. Outpatient clinics occur 5 days a week (Monday to Friday) from 8 AM to 5 PM. A comprehensive multidisciplinary epilepsy center holds clinic 2 days per week and serves approximately 50% of the active epilepsy patients. A social worker is present during these 2 days. However, a social worker is not available outside of these 2 clinic days, not available to non-epilepsy providers (the other 50%), and their time is limited compared to what is provided during the UEC as the volume of patients is significantly less. Due to staffing constraints, it is not possible for a social worker to assist for the entire volume of epilepsy patients seen at Nationwide Children's Hospital. A mix of epilepsy patients are seen in either care setting depending on the comfort of the non-board-certified epilepsy provider in seeing epilepsy patients. During the UEC, 2 additional patients are scheduled compared to an average of 75 during the other days of the epilepsy center.

We included all patients with a completed office visit, within a rolling 13 months, who had a primary or secondary diagnosis of epilepsy (ICD-9 code 345.xx). A rolling 13 months is defined as a completed office visit in neurology within 13 months of being seen in the ED for a seizure-related visit. We defined ED visits for seizure-related care as ED visits that had seizure (ICD-9 code 780.39) or epilepsy (ICD-9 code 345.xx) as either the primary or secondary reason listed for the visit. We defined unplanned hospitalizations for seizure-related care as ED visits followed by an admission to the inpatient neurology service or our pediatric intensive care unit. We estimated costs using average claims paid for ED visits and unplanned hospitalizations at Nationwide Children's Hospital in 2013: \$640 per visit per ED visit and \$18,066 per unplanned non-intensive care unit hospitalization. ED visits and unplanned hospitalizations were determined for all patients 3 months prior to presentation in the UEC and 3 months following the completed clinic appointment. Claims paid data were obtained for a level V office visit and was equal to \$133, which was utilized in our analysis. Three-month data were utilized to capture the essence of this intervention compared to outside unknown efforts and to measure the immediate effect of the intervention.

The UEC clinic began in October 2013, initially 2 days a week. With increased demand, the visits expanded to 4 days a week in December 2013. Appointments were scheduled for this clinic as needs became identified. There were 5 operational characteristics that we explicitly included in the design of the clinic in order to meet the needs of the expected patient population (figure 1).

Figure 1 Key driver diagram for urgent epilepsy clinic (UEC)**Urgent Epilepsy Clinic**

APN = advanced practice nurse; ED = emergency department.

One intervention was to provide a red flag list to our triage nurses for when to refer a patient to the UEC (table), as previous literature demonstrated that frequent calls to triage nursing are a variable for excessive ED use.⁴ A second intervention was to allow any neurology provider including on-call neurology residents to refer a patient to be seen based on an urgent need for care that otherwise was not routinely available. To decrease barriers to scheduling, a system was created that could be used by all providers in order to schedule a patient for the UEC. All neurology staff could assess the schedule to determine when availability existed for these visits and to streamline communication to the advanced practice nurse that a patient was in need of

Table Red flags to recommend patient for urgent established epilepsy clinic

Caregiver
Nonadherent to antiseizure treatment plan
Change in caregiver
High parental anxiety (perceived via phone call interactions)
Call lasting ≥ 15 minutes
Provider input
School nurse calling
Inpatient discharge planner concerns through follow-up call
On-call neurologist sends call to triage nursing
Primary care provider call about patient
Utilization
2 Emergency department visits within 30 days or 4 in 1 year
≥ 2 Calls in 1 week
≥ 2 No-shows to the outpatient neurology clinic

Children were less likely to come to the ED in the 3 months following the UEC visit compared to the 3 months prior.

an appointment. Data were collected at the time of visit to identify the potential factors that led to an ED visit or hospitalization and interventions taken during the visit to decrease the risk for future ED visits. A retrospective analysis of ED visits and unplanned hospitalizations were tracked and compared for each patient seen in the clinic for 3 months prior to and following the clinic visit.

Other interventions included using an APN and social worker who were already employed by the epilepsy center and were made available for all of these visits in addition to their normal care duties. During these visits, families were instructed on how to respond to seizures and when to appropriately utilize the ED. In addition, rescue abortive seizure medications were reviewed for proper dosing; a seizure action plan with specific instructions was given to each family, and changes in treatment were made as needed. The social worker evaluated the patient and family for psychosocial factors that increased the risk for ED visits, including assessing any barriers to provider–caregiver communication and appropriate understanding of the treatment plan. Plans were created to decrease these barriers to care for the child.

RESULTS

A total of 317 patients were seen in the UEC clinic from October 2013 through July 2015. Ninety-three percent of the 341 scheduled patients completed their appointment, which was higher than the completed appointment rate for all epilepsy-related visits to the neurology outpatient clinics (84%; $p < 0.001$ exact binomial test) and for the outpatient epilepsy center (87%; $p < 0.001$ exact binomial test). Referral sources included phone triage nurses (45%), on-call neurology residents and faculty (33%), neurology clinic staff (7%), social workers (7%), hospital follow-up calls (4%), and school nurses (4%). Sixty-five percent of the patients had an epilepsy provider as their primary neurology provider prior to referral to the UEC. Eighty-three percent of patients were seen in the clinic within 5 days and 65% within 3 days of their initial referral. Factors triggering the referral included need for education (45%), parental anxiety (42%), frequent ED visits (25%), change in seizure frequency or semiology (25%), missed appointments (23%), as well as frequent or long phone calls (13%). Common actions taken at the clinic visit included parent education and counseling (100%), change in AED (38%), development of a seizure action plan (32%), referral for nonepileptic events (18%), admission for long-term video-EEG monitoring (13%), and referral to the epilepsy surgery clinic for evaluation (13%). All 13% of patients referred to the epilepsy surgery clinic were seen by a non–epilepsy provider and outside of the outpatient epilepsy center providers. Lack of recognition of the patient being a potential surgical candidate was believed to be the reason for no referral being placed by the non–epilepsy provider. Three percent of patients required hospital admission directly from the clinic.

Children were less likely to come to the ED in the 3 months following the UEC visit compared to the 3 months prior ($p < 0.0001$, paired Wilcoxon test) (figure 2). For example, prior to the visit, 114 of the 317 (36%) went to the ED at least once, compared with 78 (25%) after ($p < 0.01$, χ^2 test). For inpatient admissions, pairwise analysis found a trend towards fewer inpatient visits ($p = 0.06$, paired Wilcoxon test). Prior to the visit, 66 (21%) had at least 1 inpatient visit over 3 months; after the visit, 55 (17%) had at least 1 inpatient visit over 3 months ($p = 0.3$, χ^2 test). For the group, total seizure-related ED use dropped from 323 in the 3 months before the clinic visit to 179 in the 3 months after, and total inpatient use from 118 admissions before to 94 admissions after.

Figure 2 Emergency department (ED) visits and unplanned hospitalizations before and after urgent epilepsy clinic appointment

Cost for ED utilization in this group of patients for only epilepsy- or seizure-related visits decreased from a baseline of \$206,720 to \$114,560 (reduction of \$92,000) in the 3 months following their visit to the UEC. Cost for unplanned hospitalizations decreased from a baseline of \$2,131,788 to \$1,698,204 (reduction of \$433,584). The visits added some cost to patient care: \$42,161. Thus, the cost savings was estimated to be \$483,423 for the population of patients seen in the UEC. Salary support for the nurse practitioner and social worker to staff the clinic were not included in the calculation and no new staff was hired for this intervention.

DISCUSSION

We found that a UEC decreased seizure-related ED visits and costs for children with epilepsy. Cost savings was estimated to be \$483,423 for the population of patients seen in the UEC after subtracting the claims paid for a level V visit. A 93% show rate was noted for this clinic compared to a show rate of 84% for neurology. Most visits were completed within 5 days after a need was identified.

By utilizing a level V follow-up clinic visit, major cost savings can be achieved in decreased health care utilization. In addition, health care optimizations and addressing complex psychosocial issues can occur in such a clinic format. The high show rate for this clinic compared to the general neurology appointments may be attributed to a caregiver's ability to access care at the time of perceived active issues. In addition, concurrently having an epilepsy provider to address medical issues and a social worker to address psychosocial issues was a benefit. The savings achieved likely occurred due to a combination of our interventions and creating a viable alternative to the ED.

We found that the 2 highest factors leading to an urgent clinic visit were lack of proper seizure care education and parental anxiety about seizures. In the UEC, we focused on educating families on seizure care during a regularly scheduled outpatient clinic appointment rather than only after witnessing an active seizure. Our outpatient clinics did not routinely screen for parental anxiety. All patients received the additional support of a social worker to help address the psychosocial and education issues during their visit and additional time was given if needed, which cannot always occur in the regular outpatient clinic setting.

This clinical model can be extrapolated to other health care systems if social work support is a strong and active presence. Further studies are planned to explore the exact nature of these psychosocial issues, such as parental mental health as a contributing factor for excessive health care utilization. These barriers can be well-addressed by social work support.

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Further, our red flag trigger list appeared to be an effective way to assess which type of patient should be seen in the UEC, although further work is needed to verify this observation. Triage nurses and on-call neurology residents/providers utilizing this list accounted for 78% of all the referrals to the clinic. Few (3%) patients seen in the UEC accounted for an unplanned admission and were admitted to the inpatient hospital neurology unit, which suggests that these patients do not warrant urgent evaluation in an ED setting. These few patients were directly admitted to the inpatient neurology service and counted in our utilization calculations. Previous studies suggest that patients with high ED utilization in 1 year will continue to exhibit high utilization¹³; therefore, our decrease is not believed to be related to normal decreases expected as seen in other disease states. Previously high utilization appeared to be the only predicted factor; however, further work on this area is ongoing.

Limitations of this project are similar to other quality improvement projects. Other ongoing efforts related to this population are unknown and beyond the scope of such projects; however, other efforts were not ongoing during this time of evaluation. In addition, total cost of care attributed to other resources could not be determined at our institution. Therefore, a complete analysis of costs is limited. Software to determine all these costs would be useful for ours and similar projects. We are aware that the University of Utah has been utilizing such software.¹⁴ More importantly, quality of patient care and improved patient satisfaction would be expected due to our efforts. However, further work to confirm this finding using patient/caregiver satisfaction is needed. The ED is not a care setting that many find helpful for routine seizure care.¹⁵ Although access to urgent care facilities can decrease ED utilization,¹⁰ these centers are not believed to be optimal as epilepsy expertise is not available in these settings.¹¹ Therefore, efforts to direct care to a more appropriate setting will likely lead to improvement, as we demonstrated here. In addition, the need for such a clinic may suggest that return visits are being scheduled too infrequently and epilepsy patients need a higher acuity of scheduled appointments. However, capacity is often a barrier for our ability to increase number of return outpatient visits. If reimbursement strategies change to improve the financial benefit of return office visits, increased capacity may result.

Overall, the use of a UEC can be effective to decrease unneeded health care utilization and provide improved quality of patient care. As the emphasis on value-based care grows, similar successes in care access and cost decreases and control will become more important. Our model may serve as an example that can achieve good results along this theme.

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AUTHOR CONTRIBUTIONS

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