

# Healthcare Utilization Related to Aspiration and Epilepsy in People with Rett syndrome in the United States

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## BACKGROUND

- Epilepsy is a common comorbidity of Rett Syndrome (RTT) affecting 60-90% of individuals.<sup>1</sup>
- The top three causes of death in RTT are lower respiratory tract infections (LRTIs), aspiration and asphyxiation, and respiratory failure.<sup>2</sup>
- There is increased risk for aspiration following seizures in individuals with developmental disabilities.<sup>3</sup>
- The role of epilepsy and aspiration as drivers of morbidity and healthcare utilization in RTT are not well established.
- To examine epilepsy and aspiration related healthcare utilization in individuals with RTT, we performed two studies using data from the Vanderbilt University Medical Center (VUMC) Electronic Health Records, including abstracted clinical progress notes.

## OBJECTIVES

- Assess the prevalence of aspiration events and epilepsy events among individuals with RTT.
- Assess the incidence of respiratory complications (LRTI and respiratory failure) and healthcare service utilization in individuals with aspiration compared to RTT individuals without aspiration.
- Characterize the healthcare service utilization related to epilepsy and aspiration among individuals with RTT.

## METHODS

### Study Design

Two distinct studies were completed, with corresponding eligible study populations:

- A retrospective comparative cohort analysis of respiratory complications and healthcare-related utilization among individuals with RTT who had an aspiration event versus no aspiration event.
- A matched case and control analysis comparing all-cause healthcare utilization among individuals with and without aspiration was evaluated.
- A retrospective comparative cohort analysis of all-cause healthcare utilization among individuals with incident epilepsy in the 12-month periods before (Baseline) and after initial indication of epilepsy (Follow-Up).

**Inclusion criteria:** One or more diagnoses of RTT (F84.2) and documentation of RTT in a clinical progress note.

**Exclusion criteria:** Documentation denying the presence of RTT in a clinical progress note. Individuals with less than 3 months of data, or less than 3 encounters were excluded (aspiration study only).

**Index date:** Date of first indication of aspiration or epilepsy. As aspiration can be silent or unwitnessed, individuals with documentation of suspected aspiration were included in the aspiration cohort (aspiration study only).

**Epilepsy cases:** Identified by ICD-10 diagnosis codes, medications, or documentation in a clinical progress note. Severe epilepsy cases were identified by the presence of prolonged, intractable, or cyanotic seizures by ICD-10 diagnosis codes (G40.XX1, G40.3X, G40A1X, G40.B1X, G40.C1X, G40.41X, G40.8X3, G40.8X4, G40.91X) or documentation in a clinical progress note.

**Aspiration cases:** Identified by ICD-10 diagnosis codes or documentation in a clinical progress note or swallowing study.

**Analysis:** Significant difference between proportions were assessed using a  $\chi^2$  test.

## RESULTS

**Table 1. Patient Characteristics among 98 RTT Individuals in the Eligible Study Population for Epilepsy**

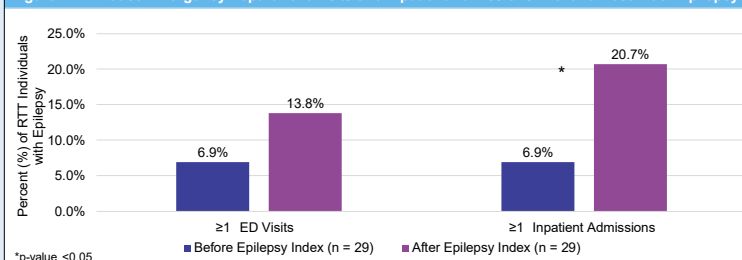
Patient Characteristic	%
Female	92.9
Race	
White	61.2
Unknown	30.6
Black	6.8
Asian	1.1
Multiple races	1.0
Epilepsy status	
Epilepsy (all)	72.4
Epilepsy, non-severe	38.7
Severe epilepsy (intractable or cyanotic seizures)	33.7
No epilepsy	27.6
Select comorbidities	
Dysphagia	40.8
Constipation	39.9
GERD	37.8
Nutritional deficiency	33.7
Weakness or paralysis	32.7
Sleep apnea	30.6
Cardiac arrhythmias	21.4

**Table 2. Patient Characteristics among 89 Individuals in the Eligible Study Population for Aspiration**

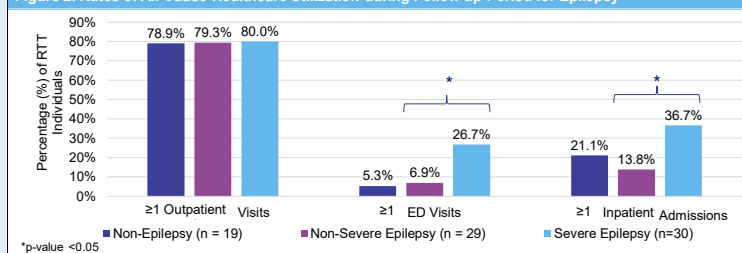
Patient Characteristic	%
Female	92.1
Race	
White	66.3
Unknown	25.8
Black	6.7
Asian	1.1
Multiple races	1.0
Aspiration	28.1
Aspiration risk factors	
Epilepsy	73.0
Dysphagia	51.7
GERD	44.9
Scoliosis	40.4
Vomiting	40.4
Gastrostomy	30.3
Choking	23.6
Select comorbidities	
Constipation	70.8
Breathing abnormalities	61.8
Nutritional deficiency	43.8
Sleep dysfunction	36.0
Weakness or paralysis	36.0

GERD=gastroesophageal reflux disorder

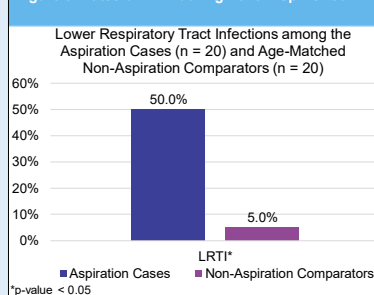
**Figure 1. All Cause Emergency Department Visits and Inpatient Admissions Pre- and Post-Index Epilepsy**



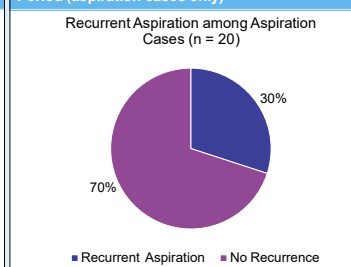
**Figure 2. Rates of All-Cause Healthcare Utilization during Follow-up Period for Epilepsy**



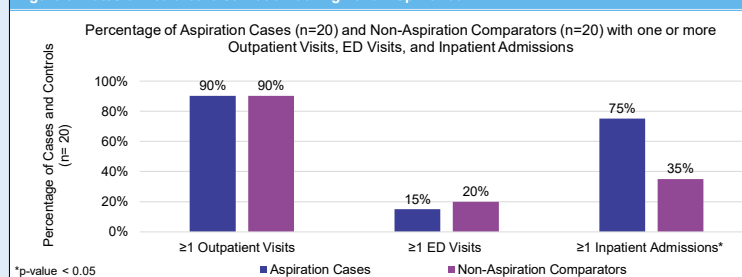
**Figure 3. Rates of LRTI during Follow-Up Period**



**Figure 4. Recurrent Aspiration in the Follow-up Period (aspiration cases only)**



**Figure 5. Rates of Healthcare Utilization during Follow-up Period**



- Over 70% of individuals with RTT had comorbid epilepsy. One-third of individuals with RTT had a severe epilepsy characterized by prolonged or intractable seizures (Table 1).
- Individuals with epilepsy were 3 times more likely to have at least one inpatient admission after their index epilepsy diagnosis than before their index epilepsy diagnosis (20.7% vs. 6.9%) (Figure 1).
- Individuals with severe epilepsy were significantly more likely to visit the ED at least once than individuals with non-severe epilepsy (26.7% vs. 6.9%). Individuals with severe epilepsy were significantly more likely to have at least one inpatient admission than individuals with non-severe epilepsy (36.7% vs. 13.8%) (Figure 2).
- Over 25% of individuals with RTT had known or suspected aspiration per Table 2. Aspiration cases were significantly more likely to experience a LRTI in the follow up period compared to the non-aspiration comparators (50% vs. 5%, respectively) (Figure 3).
- Aspiration cases had 30% recurrent aspiration event during their follow up period (Figure 4); and were significantly more likely to be admitted to the hospital at least once (75%) in the follow up period compared to non-aspiration comparators (75% vs. 35%, respectively) (Figure 5).

## CONCLUSIONS

- RTT is a rare and complex condition associated with a high prevalence of aspiration, epilepsy, and other comorbid conditions.
- Aspiration and epilepsy have high rates of inpatient utilization and ED visits.
- Caring for an individual with RTT can pose substantial economic and emotional burden for families.

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## ACKNOWLEDGMENTS

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## DISCLOSURES

Drs. Rashid, Davis and Sikirica are employees of Acadia Pharmaceuticals, Inc. who sponsored the study. Drs. Darer, LaFrance, and Huetsch and Ms. Yang are employees of Health Analytics LLC who conducted the study. Dr. Fu is an Assistant Professor of Pediatric Neurology at Vanderbilt Medical Center.

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