Poster: PRO12

Healthcare Resource Use and Expenditures in Patients with X-Linked Myotubular Myopathy (XLMTM)

Sacks NC[1,2], Healey B[1], Cyr PL[1, 3], Slocomb T[4], James E[4], Beggs AH[5,6] , Graham RJ[5,6]

[1]Precision Health Economics and Outcomes Research, Boston, MA, USA [2]Tufts University School of Medicine, Boston, MA, USA [3]College of Health and Human Services, University of North Carolina, Charlotte, NC, USA [4]Audentes Therapeutics, San Francisco, CA, USA [5]Harvard Medical School, Boston, MA, USA [6]Boston Children's Hospital, Boston, MA, USA

Introduction

Background

- XLMTM is a rare, life threatening congenital myopathy caused by pathogenic mutations of a single gene, *MTM1*
  - These mutations lead to absence or dysfunction of myotubularin, a protein required for the normal development, maintenance, and function of skeletal muscle cells [1]
- XLMTM has an estimated incidence of 1 in 40,000-50,000 newborn males [1-3]
- ~80% of affected patients experience extreme muscle weakness leading to severe respiratory distress [4]
  - 50% of patients die by 18 months of age [4]
  - Most surviving patients require permanent invasive mechanical ventilation and gastrostomy tubes [2,3]
- There are currently no approved therapies for XLMTM
  - Management is generally supportive care with increasing levels of respiratory support, which doesn't address cause of disease

Objective

- This study aimed to quantify the long-term economic burden of XLMTM

Methods

Data Source

- IQVIA PharMetrics Plus commercial claims database, with enrollment, demographic, and claims data for over 140 million individuals in the U.S.

Study Patients

- There is no XLMTM-specific diagnosis code, so patients were limited to males with 1+ reported diagnostic code(s) used for XLMTM within the first 18 months of life
  - ICD-9-CM: 359.0, Congenital hereditary muscular dystrophy or
  - ICD-10-CM: G71.2, Congenital myopathies
- Patients also met criteria identified in the RECENSUS study of confirmed XLMTM patients (NCT02231697) (**Table 1**)
- Patients with evidence of spinal muscular atrophy (SMA) or Duchenne muscular dystrophy (DMD) were excluded

Table 1. Identification of XLMTM patients

Inclusion Criteria	Patient count
Covered lives in IQVIA PharMetrics+ extract (January 1, 2006 – June 30, 2018)	>130 million
1+ XLMTM diagnosis (ICD-9 359.0 or ICD-10 G71.2), who were male, aged <18 years old	3,216
Patients with 1+ genetic test and/or muscle biopsy	484
Patients with no evidence of SMA diagnosis (1+ inpatient or 2+ outpatient SMA diagnoses, or evidence of Spinraza use)	458
Patients with history of any ventilation	112
Patients with no evidence of DMD (evidence of Exondys 51 or Emflaza use)	109
Patient who had at least 1 hospital admission	94
Patients with first XLMTM diagnosis under age 2 years	49

XLMTM is a rare disease; From a database of 130 million lives, 49 patients meeting the criteria were identified.

Study Design

- Longitudinal retrospective analysis using IQVIA PharMetrics+ paid commercial claims; Study window: 1/1/2006 to 9/30/2018

Outcomes

Stratified by age:

- Healthcare resource utilization, including inpatient hospital admissions, emergency department visits without inpatient admission, outpatient services (outpatient hospital visits, physician office visits, labs, imaging, and home health), and prescription medications
- Mean annual per patient costs for commercial insurers

Results

Study patients

- 49 patients met inclusion criteria
  - Mean age at first observable diagnosis was 4.4 (SD: 5.9) months
  - Patients were observable for an average of 3.16 (SD: 4.18) months prior to diagnosis, and 30.94 (SD: 31.38) months following diagnosis (**Figure 1**)

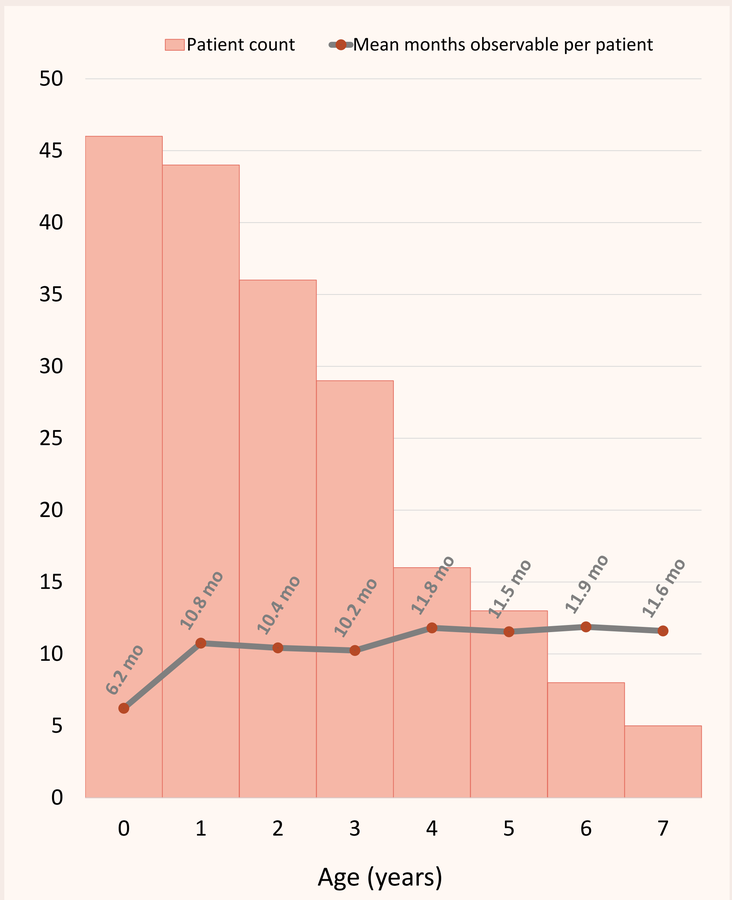
Healthcare resource use

- Patients had an average of 7.29 (SD: 7.07) inpatient hospitalizations in the year following diagnosis
- The mean length of stay was 123.35 (SD: 159.15) days
- 73% of patients had at least one NICU stay
  - There was an average of 1.29 (SD: 1.21) NICU admissions per patient
  - The mean length of a NICU stay was 47.39 (SD: 65.92 days)
- All patients eventually required ventilator support
- 80% of patients received tracheostomies

Costs

- Costs were highest in the first 4 years of life (**Table 2, Figure 2**)
  - Mean annual costs were $403,101 per patient
  - From birth to age 4 costs totaled $1,612,405, on average
- Costs were lower for patients who survived past age 4 from age 4 to age 7 years
  - Annual costs were $214,949 from ages 4 to 7 years

Figure 1. Number of observable XLMTM patients in cohort by age



In the study cohort of 49 patients there were 46 patients under 1 year of age who contributed 286 observed patient months in the first year of life. There were 44 patients observed between ages 1 and 2, for a combined 473 observed patient months in the second year of life. As age increased, the number of observable patients decreased.

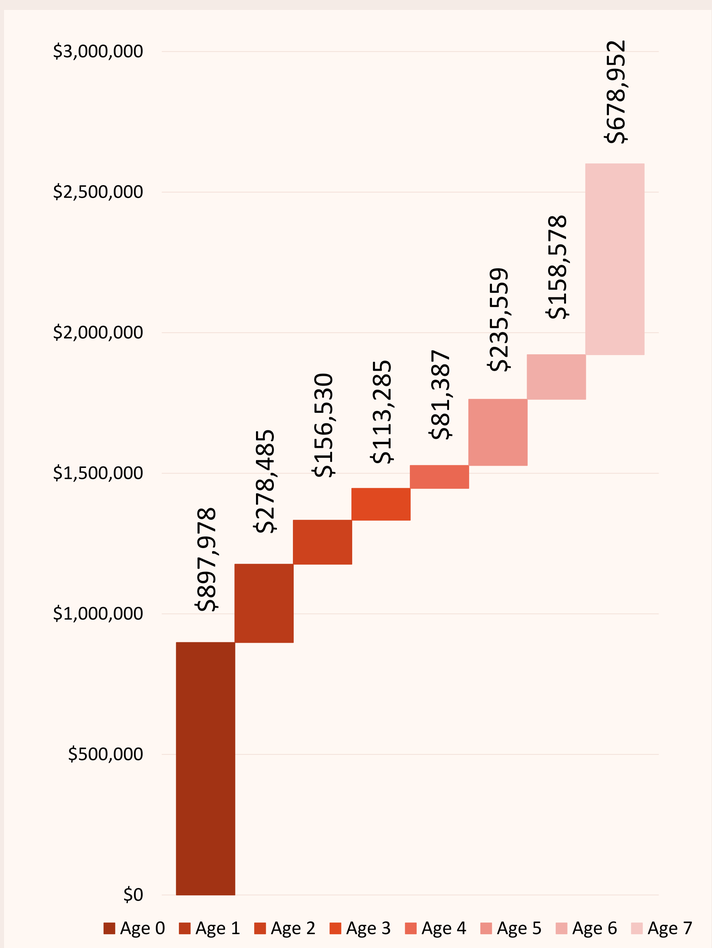
Table 2. Mean monthly healthcare costs by age and type, *USD*

Patient age (years)	Total healthcare costs	Inpatient admissions	Outpatient visits	Prescription medicines	Emergency Department visits*
0	$74,831	$69,025	$5,266	$540	$130
1	$23,207	$15,496	$7,027	$684	$221
2	$13,044	$5,479	$6,922	$643	$103
3	$9,440	$4,730	$4,233	$478	$155
4	$6,782	$2,375	$3,677	$730	$222
5	$19,630	$16,084	$2,841	$705	$225
6	$13,215	$9,096	$2,769	$1,350	$133
7	$56,579	$53,673	$2,321	$585	$186

* Emergency department costs are included in the reported outpatient visits cost

Mean monthly per-patient direct medical costs over time were highest in the first year of life ($74,831, SD: $75,822), including costs for inpatient admissions ($69,025), outpatient services ($5,266) and prescription medication ($540). Mean monthly costs were $23,207, $13,044, and $9,440 in the second, third, and fourth years of life, respectively

Figure 2. Average annual cost per patient by age, *USD*



Patients in the first year of life have the highest projected annual cost of slightly less than $900,000. As patients age the average annual cost per patient per year decreases until age 4 and increases again from age 5-7.

Limitations

- XLMTM is a life-threatening condition with mortality of 50% before 18 months of age; as such, costs in older patients are likely impacted by a survival bias
- Longitudinal data are sparse, limiting our ability to show long-term, comprehensive costs
- Home-health and durable medical equipment claims are paid first by Medicaid; therefore the direct economic burden of XLMTM may be greater, especially in stabilized patients

Conclusions

Healthcare resource use is intensive in XLMTM, with costs highest at the beginning of life when the need for intensive life-supportive resource use is greatest, prior to longer term stabilization, when achieved.

References

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Disclosures

Mr. Slocomb is an employee of Audentes Therapeutics and Dr. James is a former employee of Audentes Therapeutics. Dr. Sacks, Mr. Cyr and Ms. Healey are employees of PRECISIONheor, a division of the Precision Medicine Group, which received funding from Audentes Therapeutics for this research. Dr. Graham and Dr. Beggs have previously received support from a sponsored research agreement with Audentes Therapeutics.

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