Understanding the Patients' Journey Pre– and Post–Diagnosis of Facioscapulohumeral Muscular Dystrophy (FSHD): a Real–World Retrospective Data Analysis

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Objectives

Describe the changes in outcomes (healthcare conditions, services, costs, and care days) for patients with FSHD compared with matched controls (MCs) 2 years post-diagnosis versus 2 years pre-diagnosis

Background

- FSHD is a rare, slowly progressive, genetic skeletal muscle disease. Muscle weakness usually presents in the face and upper extremities, eventually extending to the trunk and lower body[1,2]
- Patients experience significant physical limitations, pain, fatigue, and an overall negative impact on wellbeing.[3,4] Real-world data characterizing the patients' pre-diagnosis journey are limited
- Currently there is no cure or targeted treatment for FSHD[5]

Methods

- Retrospective database analysis to compare outcomes for patients with FSHD versus MCs
  - Database: IQVIA US PharMetrics® Plus Timeframe: January 2016 through March 2021
- The FSHD cohort is defined as having ≥2 FSHD claims ≥30 days apart
  - Claims identified by International Classification of Disease Tenth Revision (ICD-10) code G71.02
  - The first diagnosis date was used for the index date
- FSHD patients were matched to a 5% random sample of eligible non-FSHD controls
  - Matching was done using R's Matchit procedure, with nearest neighbor matching (exact matching on month of index date)
- Cohorts were matched (5-MC:1-FSHD) on index month and baseline age, region, gender, plan, and payer types
- All subjects (patients and MCs) had a minimum of 48 months of continuous data:
  - 24 months prior to their index date
  - 24 months following ("post") their index date (includes the index date)
  - The index date was the beginning of the post-index evaluation period
- The prevalence, costs, and services were compared 2 years post-diagnosis versus 2 years pre-diagnosis using:
  - Location of care data for overall care
  - 283 US Agency for Healthcare Research and Quality (AHRQ) comorbidity categories
- Post-pre changes were compared within cohorts (using McNemar tests) and between cohorts (using *t*-tests)

Results

- We identified 79 FSHD patients and 395 MCs
  - There were no significant differences ($p>0.05$) between cohorts for age, gender, US region, patient plan type, and patient insurance type (Table 1)
- The cohorts had significant ($p<0.05$, except where noted) differences for the Charlson Comorbidity Index (Table 2)
- Within the FSHD cohort, the following locations of care had significant ($p<0.05$) increases in outcomes:
  - The difference in percent of patients seeing the Emergency Department was 16.5% (primarily due to increases in respiratory condition visits)
  - The difference in percent of patients with services in "Other" locations of care was 15.2%
  - Number of medical and drug days of service increased by 6.0 days (also significantly greater than the 0.9-day increase in the MC cohort)
  - Total annual medical costs per person increased $5,646
- FSHD patients had more comorbidities:
  - Prevalence increased significantly in five AHRQ categories (Figure 1)
  - Costs changed significantly in six AHRQ categories (Figure 2)
  - Number of services per person per year increased significantly in three AHRQ categories (Figure 3)

Table 1: Age, Region, Insurance, and Payer Types Were Similar Between FSHD Patients and MCs

Descriptive Characteristics	FSHD Patients (N=79)
Gender, % Female	43.0%
Age, mean years (SD)	47.9 (17.9)
Age, years	
<18	6.6%
≥18 to <35	17.6%
≥35 to <45	11.0%
≥45 to <55	22.4%
≥55 to <65	30.3%
≥65	12.1%
US Region	
South	33.1%
Midwest	30.0%
Northeast	20.3%
West	16.6%
Insurance Type	
Preferred Provider Organization	61.7%
Health Maintenance Organization	29.3%
Point-of-Service Plan	1.0%
Consumer-Directed Health Care	5.9%
Indemnity/Traditional Plan	2.1%
Payer Type	
Commercial	61.7%
Self-Insured	29.3%
Medicaid	1.0%
Medicare Advantage	5.9%
Medicare Supplemental	2.1%

There were no significant differences between FSHD patients and MCs $p>0.05$

Table 2: Before and After Diagnosis, Charlson Comorbidity Index Scores Were Higher for FSHD Patients Versus MCs

Descriptive Characteristics	FSHD Patients (N=79)	MCs (N=395)
Pre-index (before diagnosis)		
Mean (SD) score	1.13 (1.65)	0.74 (1.67)
Percent with values >1*	27.8%	14.2%
Post-index (after diagnosis)		
Mean (SD) score*	1.37 (1.65)	0.82 (1.73)
Percent with values >1*	29.1%	17.5%

*Difference significant at $p<0.05$

Abbreviations:
AHRQ, US Agency for Healthcare Research and Quality; FSHD, facioscapulohumeral muscular dystrophy; ICD-10, International Classification of Diseases, Tenth Revision; MC, matched controls.

References:
[1]Greco A, et al. *Clin Genet.* 2020;97(6):799–814.
[2]Statland JM and Tawil R. *Continuum (Minneap Minn).* 2016;22(6):1916–31.
[3]Hamel J, et al. *Neurology.* 2019;93(12): e1180–e1192.
[4]Tawil R and Van Der Maarel SM. *Muscle Nerve.* 2006;34(1):1–15.
[5]Tawil R, et al. *Neurology.* 2015;85(4):357-64.

Conclusions

- Healthcare utilization increased significantly in FSHD patients following diagnosis and was higher both overall and in different categories than in MCs
  - This likely reflects the need to investigate and manage previously unsuspected manifestations of FSHD following formal diagnosis
- Future research should confirm if these findings hold true in longer-term follow-up
- These data highlight the many unmet needs for FSHD patients, including higher costs, more days of care, more prevalent and costly comorbidity management and the need for novel targeted treatments
- Based on the high unmet need, Avidity Biosciences is planning clinical trials with a first-in-class antibody oligonucleotide conjugate targeting DUX4, the underlying cause of FSHD, in 2022

Figure 1: FSHD Patients Had Higher Increases in Prevalence for AHRQ Categories of "Immunizations/Screening for Infectious Disease", "Other Aftercare", and "Other Gastrointestinal Disorders" Versus MCs

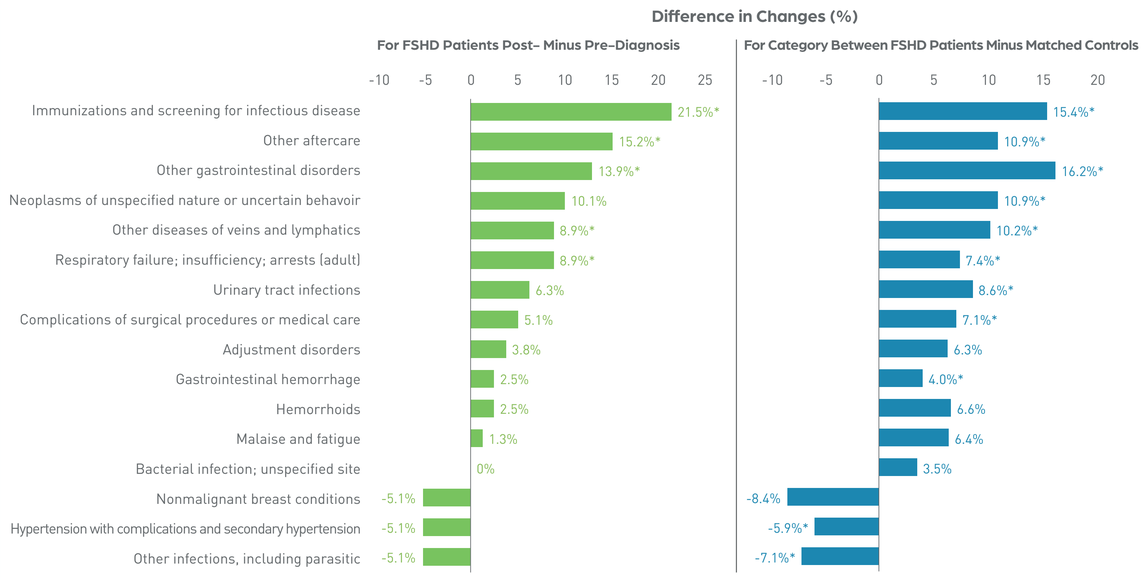


Figure 2: FSHD Patients Had Higher Increases in Costs in AHRQ Categories Related to "Residual Codes; Unclassified" and "Other Lower Respiratory Disease" Versus MCs

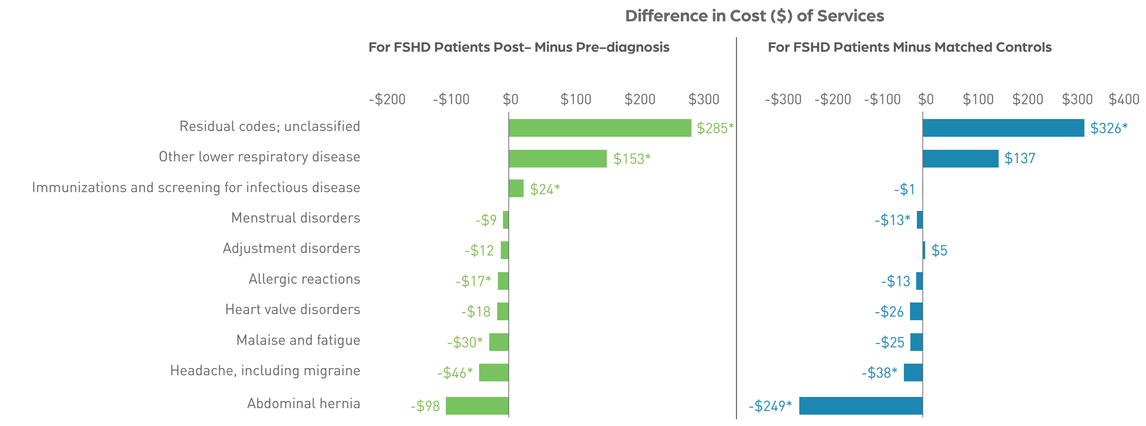
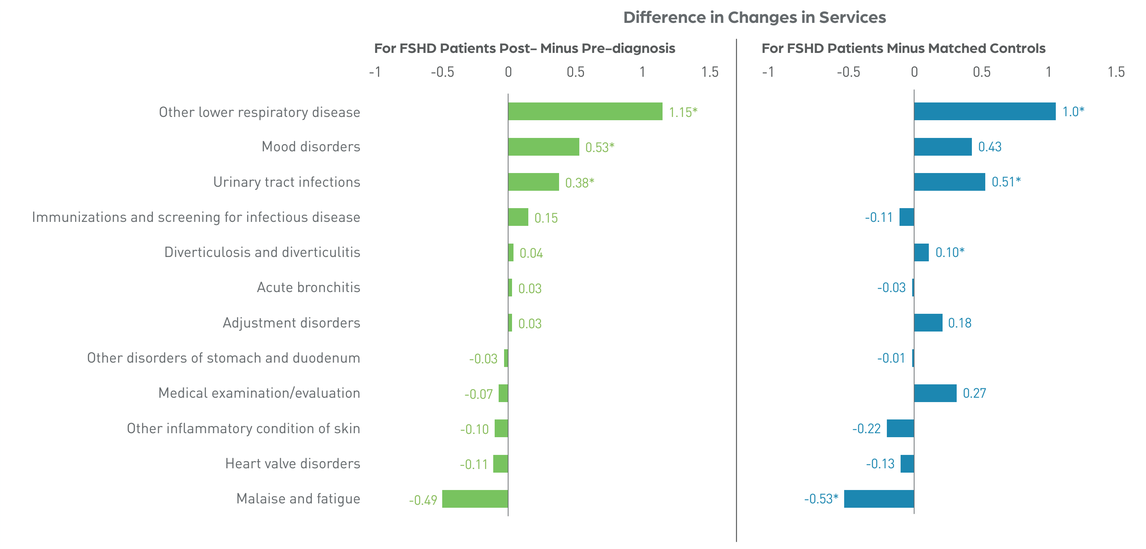


Figure 3: FSHD Patients Had Higher Increases in Services for "Other Lower Respiratory Disease," "Mood Disorders," and "Urinary Tract Infections" Versus Matched Controls



*$p<0.05$