OBJECTIVE

- Published data were evaluated to understand the full economic burden and to identify cost drivers of fragile X syndrome (FXS) to the healthcare system, society, and families caring for individuals with FXS.

BACKGROUND

- Individuals with FXS experience intellectual disability and reduced functional abilities, including problems with attention, behavior, and anxiety.
- Evidence is beginning to converge on the use of medical specialists, allied health professionals, and prescription medication among individuals with FXS.
- Resource utilization and costs are critical to populate economic models to demonstrate the value of new health technologies for the treatment of FXS.
- Estimates of direct, indirect, and intangible costs by country are needed to evaluate cost-effectiveness and value of new therapies relevant to the local health care system.

RESULTS

Study Geographies

- Eight articles report data from studies conducted in the United States (US).
  - Medicare data 2000-2010 from South Carolina.
  - These data represented inpatient and outpatient prescription drug claims and cost data utilized for health care services of more than 10 million persons in the US.
- Administrative health care claims data 1999-2013 for Optum Health Reporting and longitudinal payer database.
- US caregiver survey data 2007.** Approximately 66% of families reported having insurance coverage.

- Two articles report data from studies conducted in European Union countries (Bulgaria, Germany, Italy, Hungary, Italy, Spain, Sweden, United Kingdom). Data were collected for 2011 through 2013.**
- One article reports data from a study conducted in Ontario, Canada.**

DESIGN/METHODS

- PubMed served as the primary database for the electronic literature search.
- Abstracts were reviewed for relevance based on predefined criteria, focusing on the economic burden of FXS, resource utilization, and benefits and costs of medical services, mental health, sex disorders, therapy, pregnancy, and hospitalization, and direct and indirect costs (e.g., productivity, labor force participation).
- As shown in Figure 1, the original search yielded 870 abstracts, and rejection of duplicates resulted in 695 abstracts, leaving the search to 10 years since publication reduced distinct articles to 484. After review of articles, 13 summaries were extracted. Of 317 articles, 13 were summarized in a full report, and 11 are cited in this paper.

Figure 1. Review and Selection Process for Cited Literature

Table 1. Select Studies Reporting Direct and Indirect Costs of FXS

<table>
<thead>
<tr>
<th>Article</th>
<th>Year of Data Collection</th>
<th>Healthcare System</th>
<th>Year(s) of Data Collection</th>
<th>Analysis Method</th>
<th>Data Source(s)</th>
<th>Cost Drivers</th>
<th>Key Results on Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alexy et al., 2013</td>
<td>2008</td>
<td>Medicare</td>
<td>1997-2012</td>
<td>Medicaid</td>
<td>Com/Med: $17,747 vs. non-FXS: $13,803</td>
<td>Outpatient therapy, hospitalizations</td>
<td>56% of average monthly medical costs for care services, with an average monthly cost of $1,249</td>
</tr>
<tr>
<td>Heywood et al., 2014</td>
<td>2008</td>
<td>Medicaid</td>
<td>1997-2012</td>
<td>Medicaid</td>
<td>Com/Med: $14,677 vs. non-FXS: $6,103</td>
<td>Medical aids (e.g., orthotics, glasses)</td>
<td>47% of families reported FXS caused an excessive financial burden; 60% of families had to change work or stop work; median annual OOP expenses were $1,800</td>
</tr>
<tr>
<td>Ritvo et al., 2013</td>
<td>2008</td>
<td>Medicare &amp; Medicaid</td>
<td>1999-2012</td>
<td>Medicaid &amp; Commercial</td>
<td>Medicaid and Commercial/Medicare</td>
<td>Hospitalizations</td>
<td>Patients with FXS had greater mean hospital costs in the Medicaid and Commercial insurance group.</td>
</tr>
<tr>
<td>Sacco et al., 2013</td>
<td>2008</td>
<td>Medicare</td>
<td>1997-2012</td>
<td>Medicaid</td>
<td>Com/Med: $14,677 vs. non-FXS: $6,103</td>
<td>Medical aids (e.g., orthotics, glasses)</td>
<td>46% of caregivers of males reported OOP costs for medical aid; 47% of families reported FXS caused an excessive financial burden; 60% of families had to change work or stop work; median annual OOP expenses were $1,800</td>
</tr>
<tr>
<td>Vekeman et al., 2015</td>
<td>2008</td>
<td>Medicaid, Medicare</td>
<td>1997-2012</td>
<td>Medicaid &amp; Commercial</td>
<td>Medicaid and Commercial/Medicare</td>
<td>Hospitalizations</td>
<td>Patients with FXS had greater mean hospital costs in the Medicaid and Commercial insurance group.</td>
</tr>
</tbody>
</table>

Economic Burden on the Family

- Many patients with FXS have difficulty with basic functional skills and need specialized therapies, such as speech and language therapy, physical therapy, and occupational therapy, to address these needs. Of the utilization of these services is high across payer types (Figure 3).
- In a survey of 1,219 families in the US reporting out-of-pocket (OOP) expenditures in 2007, most OOP expenses were for therapy (31%), transportation (31%), medication (19%), supervision (8%), and other medical costs (6%).
- More than 62% of families in the US survey report an employment impact (i.e., quit working, took a job, changed work hour) because of FXS.
- Higher percentages of patients with children of FXS (48%) reported reducing hours when compared with parents of children with autism spectrum disorder and intellectual disability (46%), parents of children with intellectual disability (41%), or parents of children with autism spectrum disorder only (16%).
- Limits in reasoning or learning ability, irritability, and co-occurring symptoms were inversely associated with economic and employment impacts for caregivers.

Figure 4. Percentages of US Patients Who Received Therapy Services

- While there is no current treatment for FXS, evidence is beginning to emerge on direct and indirect costs associated with FXS.
- In the US, across payer types, annual direct health care costs are a greater proportion of annual costs associated with FXS, in contrast with European countries, where the annual direct non-health care costs (i.e., informal caregivers) are the larger proportion of annual costs.
- In the US and Europe, the most frequently identified direct cost drivers are hospitalizations, medications, outpatient visits, and home care.
- The economic burden on the family is driven by lost productivity, inadequate medical insurance, and OOP expenditures.
- Longitudinal cost studies can elucidate health care resource utilization and cost drivers across the life span to provide evidence to health care providers, policy makers, and payers on future cost-effective delivery of care. Contemporary cost estimates for pediatric and adolescent patients will be helpful to understand the value of future targeted treatment soon after diagnosis.

CONCLUSIONS

- This review highlights the considerable economic burden experienced by caregivers and families across geographic regions for an individual with FXS, beyond direct health care costs, economic burden includes direct non-health care costs, OOP expenses not covered by health care insurance, lost work productivity, and other societal costs.
- The cost of care varies across payer types, geographic regions, and patient severity.
- New research is warranted to provide contemporary cost estimates that can be used in economic models and to better characterize symptom-related cost drivers and the impact of economic burden for all stakeholders.

REFERENCES

See handout for references.

CONTACT INFORMATION

Patricia Sacco, MPH RPh
Senior Director
RTI Health Solutions
200 Park, Office Drive
Research Triangle Park, NC 27709
Phone: +1 919 248-8589
E-mail: psacco@rti.org

A Literature Review of the Economic Burden of Fragile X Syndrome

Sacco P*1, Raspa M*2, Leaky L1, Cabo R1

1RTI Health Solutions, Research Triangle Park, NC; 2RTI International, Research Triangle Park, NC; 3Ovid Therapeutics, New York, NY

© 2018 Ovid Therapeutics