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Identifying Educational Needs of Pediatric Neurologists in Diagnosing and Managing Patients With SMA

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INTRODUCTION

- Spinal muscular atrophy (SMA) is a rare autosomal recessive neuromuscular disorder affecting ~1 in 10,000 live births.[1]
  - SMA is categorized into 4 clinical phenotypes based on age of onset and motor function.
  - Severity ranges from infantile-onset type 1 (poor life expectancy) to adult-onset type 4 (mild course).
- Diagnosis involves genetic testing for homozygous deletion or mutation of the survival of motor neuron 1 (*SMN1*) gene[1]; diagnostic delay is common.[2]
- Differential diagnoses should consider congenital myopathies/other neuromuscular disorders.
- There is currently limited information describing practice patterns, attitudes, and unmet needs of neurologists who encounter patients with SMA.

OBJECTIVES

- To identify practice patterns, perceptions, and educational needs of pediatric neurologists who manage patients with SMA.

METHODS

- A survey, based on 2 case vignettes,[3] was developed in collaboration with clinical experts. The survey was then piloted, translated, and distributed by email in July 2015 to pediatric neurologists and neurologists who encounter patients with pediatric neuromuscular disorders.
- Demographics (country of practice, specialty, type of practice, practice population, major professional activity) were collected.
- For each vignette, the differential diagnosis was solicited based on the presenting symptoms of the patient.
- Further test results were then provided and responses to corresponding survey questions pertaining to the diagnostic approach were requested.
- Additionally, the importance of functional tests and clinical trials also was queried.

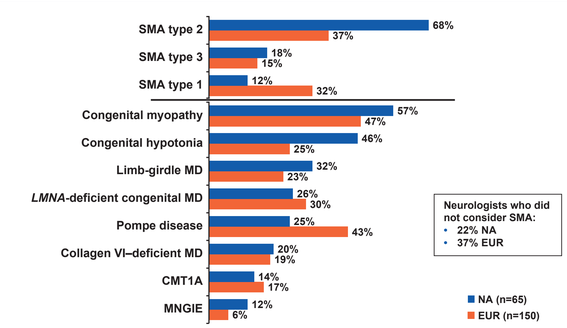
RESULTS

- Sixty-five North American (NA) and 150 European (EUR) neurologists responded (Table).

Case Vignette 1

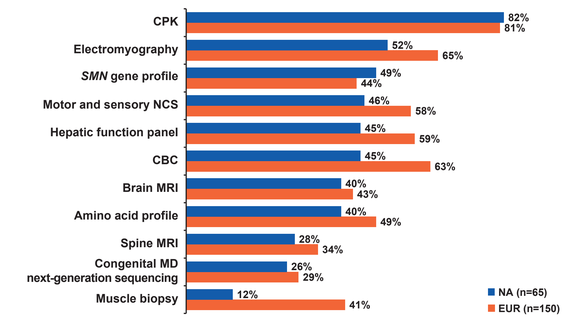
- Presenting symptoms: 20-month-old boy unable to walk, with profuse drooling and a fine tremor when holding objects.
- Differential diagnosis—initial diagnoses considered by neurologists:
  - Sixty-eight percent (NA) and 37% (EUR) of neurologists initially considered SMA type 2 (Figure 1) as part of the differential diagnosis, while 22% (NA) and 37% (EUR) did not consider any type of SMA.
  - Creatine phosphokinase (CPK) and electromyography were commonly recommended tests; <50% suggested *SMN* gene profiling (Figure 2).
- Diagnosis upon receiving test results that were consistent with SMA type 2:
  - Eighty percent (NA) and 75% (EUR) correctly diagnosed the patient after receiving additional test information
  - Forty-five percent (NA) and 32% (EUR) would not have used a standardized test to monitor functional changes.

Figure 1. Case vignette 1: initial diagnoses considered by neurologists



CMT1A = Charcot-Marie-Tooth disease type 1A; *LMNA* = lamin A/C; MD = muscular dystrophy; MNGIE = mitochondrial neurogastrointestinal encephalopathy
Graphs ordered by condition most frequently considered by NA neurologists (SMA type appearing first)

Figure 2. Case vignette 1: tests recommended by neurologists

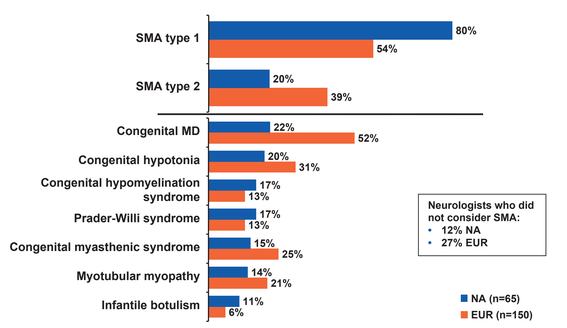


CBC = complete blood count; NCS = nerve conduction studies; MRI = magnetic resonance imaging
Graphs ordered by tests most frequently recommended by NA neurologists

Case Vignette 2

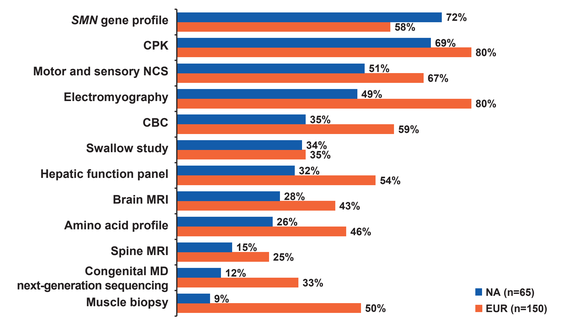
- Presenting symptoms: 4-month-old girl presenting with low muscle tone and slow weight gain.
- Differential diagnosis—initial diagnoses considered by neurologists:
  - SMA type 1 was the most commonly suspected condition (Figure 3).
    - Twelve percent (NA) and 27% (EUR) of neurologists did not consider any form of SMA.
  - Seventy-two percent (NA) and 58% (EUR) of neurologists recommended *SMN* gene profiling for the patient; CPK, motor and sensory nerve conduction studies, and electromyography also were frequently recommended (Figure 4).
- Diagnosis upon receiving test results that were consistent with SMA type 1:
  - With additional test results, 77% (NA) and 62% (EUR) correctly diagnosed SMA type 1
    - Fifteen percent (NA) and 29% (EUR) diagnosed the patient with SMA type 2
  - Fifty-two percent (NA) and 39% (EUR) would not have used a standardized test to monitor functional changes.

Figure 3. Case vignette 2: initial diagnoses considered by neurologists



Graphs ordered by condition most frequently considered by NA neurologists (SMA type appearing first)

Figure 4. Case vignette 2: tests recommended by neurologists



Graphs ordered by tests most frequently recommended by NA neurologists

Table. Neurologist demographics

Parameter	NA[a] n=65	EUR[b] n=150
Mean no. of patients seen per week	**55**	**91**
Patients with pediatric neuromuscular disorders, %	**24**	**14**
Neurologists who see ≥1 patient with SMA per year, %	**91**	**87**
Work environment, %		
Solo practice	11	5
Group practice	20	9
Medical school	38	11
Hospital setting	31	74
Other	0	1

[a]Includes Canada and the United States
[b]Includes France, Germany, Italy, Spain, and the United Kingdom

Clinical Trials in SMA

- Twenty-eight percent (NA) and 60% (EUR) of neurologists did not consider the referral of patients with SMA for clinical trials to be very important.

CONCLUSIONS

- This survey shows a lack of SMA disease awareness among some pediatric neurologists.
  - When presented with cases of SMA, ~15–40% of neurologists did not consider SMA to be part of the differential diagnoses.
  - Recommendations for *SMN* gene profiling varied between the 2 case vignettes.
- Results of the survey support educational initiatives that focus on:
  - Improving the awareness and consideration of SMA
  - Assisting in the diagnosis of SMA type
  - Discussing the role of *SMN* gene profiling
  - Providing information about the benefits of using standardized functional tests to monitor clinical changes.

References

1. D'Amico A, *et al. Orphanet J Rare Dis.* 2011;6:71.
2. Lin CW, *et al. Pediatr Neurol.* 2015;53(4):293-300.
3. Peabody JW, *et al. Ann Intern Med.* 2004;141(10):771-780.

Disclosures

AF: former employee of Biogen; JY: employee of and holds stock/stock options in Biogen; JB and SH: no disclosures.

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