

The Impact of Key Health State Transitions on Health-related Quality of Life in Duchenne Muscular Dystrophy: A Qualitative Study

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BACKGROUND

- Duchenne muscular dystrophy (DMD) is a rare X-linked disorder caused by mutations in the dystrophin gene. Progression of DMD is characterized by loss of ambulation (LOA) and upper limb function, pulmonary dysfunction, cardiomyopathy, and ultimately, premature mortality¹
- Studies that quantify the health-related quality of life (HRQoL) impact of DMD have described the effect of LOA, while other clinical milestones in DMD have received less attention and their HRQoL impacts are less well understood²⁻⁴
 - Measurement of HRQoL impact is needed for value assessments of therapies in DMD
 - Patient perspectives should be incorporated throughout this process to ensure that HRQoL is taken into consideration
 - Patient experience may also provide essential context to clarify how symptoms and clinical events link to HRQoL and activities of daily living

OBJECTIVE

- The objective was to understand patient perspectives on the HRQoL impacts of key health state transitions that characterize the progressive loss of physical function experienced by individuals with DMD

METHODS

- Individuals living with DMD and/or their caregivers, as proxies, were recruited for qualitative interviews (see Figure 1 for eligibility criteria)
- A semi-structured interview guide was developed to elicit participant experiences of living with DMD and the impact of DMD on HRQoL
 - In addition, demographic and clinical information was collected from participants
 - Interview questions were informed by literature review and consultation with methodological and clinical experts in DMD
- Web-based interviews were conducted, audio-recorded and transcribed
- Demographics and clinical characteristics were summarized to describe the range of clinical stages within the study sample
- Interview transcripts were coded in Taguette and patterns in participant experiences were explored using semantic thematic analysis;⁵⁻⁷ themes were constructed to describe how key health state transitions, identified by patient report within the analysis, impact HRQoL in DMD

Figure 1: Eligibility criteria

- Men and boys (age ≥7 years) who self-report a confirmed diagnosis of DMD, or their primary caregiver
- Living in the US
- Fluent in English
- Capable of providing informed consent

RESULTS

- Twenty-one caregivers, 3 patients and 5 patient-caregiver dyads were interviewed
- Mean (standard deviation) patient age was 12.9 (5.4) years. At the time of the interview, 58.6% of patients were non-ambulatory, 34.5% had preserved upper limb function and 31.0% used nocturnal ventilation (Table 1)
- Key transitions identified based on patient and caregiver feedback included LOA, initiating nocturnal ventilation, and loss of upper limb function (Figure 2)

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RESULTS

- LOA was often described as a gradual, yet emotionally challenging transition
 - The use of mobility devices helped some individuals to regain some of the independence previously lost when their lower limb function was deteriorating
 - Transitioning to using a wheelchair full time was also associated with new challenges related to accessibility which limited social participation in some situations
- Starting nocturnal ventilation caused anxiety for some individuals, but for those who made the adjustment, it often helped to improve sleep quality and daytime energy
- Loss of upper limb function was often described as more difficult for patients than LOA because it impacts

Table 1. Sample demographics and patient clinical characteristics

	Overall (n=29)	Caregiver (n=21)	Patient (n=3)	Patient + caregiver (n=5)
Sample demographics				
Age in years, mean (SD)				
Caregiver	40.2 (7.8)			
Patient	12.9 (5.4)			
Patient age at diagnosis	3.3 (2.1)			
Patient clinical characteristics				
Ambulatory status, n (%)				
Ambulatory	7 (24.1)	6 (28.6)	0 (0.0)	1 (20.0)
Transitional	5 (17.2)	5 (23.8)	0 (0.0)	0 (0.0)
Non-ambulatory	17 (58.6)	10 (47.6)	3 (100.0)	4 (80.0)
Upper limb function, n (%)				
Preserved	10 (34.5)	9 (42.9)	0 (0.0)	1 (20.0)
Mildly impaired	9 (31.0)	7 (33.3)	0 (0.0)	2 (40.0)
Moderately impaired	9 (31.0)	4 (19.0)	3 (100.0)	2 (40.0)
Severely impaired / loss of upper limb function	1 (3.4)	1 (4.8)	0 (0.0)	0 (0.0)
Ventilation use, n (%)				
None	20 (69.0)	16 (76.2)	1 (33.3)	3 (60.0)
Nighttime ventilation*	9 (31.0)	5 (23.8)	2 (66.7)	2 (40.0)

*No patients included used daytime ventilation

- patients' ability to complete everyday tasks independently, such as bathing, dressing, toileting and eating
- In addition, some patients had difficulty ambulating for as long as they could remember; and by comparison, the loss of hand and arm function was more recent and much harder to adapt to
- The HRQoL impact of progression to decreasing cardiac function was not perceptible by patients and caregivers

Figure 2: Illustrative quotes describing the HRQoL impacts of key transition in DMD

LOA

"He says everyone stares at me and ... I think the wheelchair, you know, you just look. And I do think that's what gives him the anxiety, because they don't say hi necessarily, they're just kind of looking."

"In the beginning, when he was losing abilities and did not have the wheelchair, he kind of felt like he lost his freedom, but once the wheelchair came into play, he regained that and was able to do things again."

"He's grown up a little and gets kind of used to it. I think when he was younger it did both him to see people riding bikes or people just running by when here I am, I can't do that. Or, 'Hey friends, wait for me...I'm catching up here.'... He's grown up and knows that the friends that he does have, if they want to play with him, they'll still be by him whether he's in a chair or whether he's walking next to them."

"He's limited on physically seeing them [friends] or being with them because we have to take everything into consideration. Can he get in the house? How is their yard? Do they have rugs?... People have to come to him more than he can go to them."

Initiating nocturnal ventilation

"It makes me feel better, but it's just, at first, it was a little hard to adjust to having to wear it...I was a little bit nervous about wearing it."

"He didn't want to use it. His pulmonologist was trying to give him all the benefits of using it and he was so reluctant...And it was very hard for him to get started, and once he started... every night, he uses it."

"I was somewhat nervous about it, but for me, the main reason it was kind of a big transition was because it occurred quickly. Like within a day."

Loss of upper limb function

"He was saying, you know, recently that, 'Mum, you know, am I going to lose all my hand function eventually?' He said, 'I've barely got any left now.' And that is frustrating for him because I've got to position his hands on the laptop exactly where he wants them."

"He didn't want to go out to restaurants for quite a while when that first happened...I would have to feed him, he did not want to do that at first. So, that was a little bit more of a struggle."

"He'll get frustrated or he's crying because he's unable to do something... I think right now we're just relieved that he's still able to feed himself and play games but... he's snapped at us or he's gotten angry and when we ask him why, it's hard for him to say why."

"Because he never ran, he's never jumped... He could walk, but with a gait... And so, the fact that the arms, you can't lift them to the table, and stuff like that, it was a lot harder to deal with that, not being able to itch his face or, if you have something in your teeth or anything like that, he needs help... He said it was dumb."

DISCUSSION

- LOA, initiating nocturnal ventilation, and loss of upper limb function have substantive impacts on patient HRQoL
- Patients considered loss of upper limb function to be the most challenging transition due to accompanying loss of independence and increase in dependence and reliance on others
- The gradual loss of lower limb function that culminates in LOA also impacts physical, social and emotional aspects of HRQoL
 - While loss of upper limb function may be more prominently linked to loss of independence, it should be noted that the ability of mobility devices to facilitate social participation and independence post-LOA is moderated by social and environmental factors; for example, accessibility of homes of friends and family members, aspects of the built environment, and extent of social inclusion⁸
- Nocturnal ventilation was described positively among those who use it regularly; however, previous research has identified barriers to uptake and adherence that may prevent some patients from benefiting from this health intervention⁹

- Such barriers include prior negative experiences with interventions and/or difficulty adapting, perceived lack of symptom improvement, and limited family or healthcare team support, among others
- Cardiac implications did not have a major impact on HRQoL in this sample of patients, potentially due to the fact that most individuals have asymptomatic disease; and also because of limited mobility and exertion among those with more progressed DMD symptoms
- Limitations include that, of necessity, particularly for younger children, reports were provided by caregiver proxies, whose opinion of the impact of a transition may differ from that of the patient. Additionally, despite best efforts, recruitment into the most clinically progressed categories was limited meaning that certain patient experiences, such as the use of daytime ventilation as well as reflections of patients who had experienced life-threatening cardiac event, were missed.

Findings from this study highlight clinical transitions and events in DMD that are important from patient and caregiver perspectives