Expanded Diagnoses Outside of Specialized Amyloidosis Centers: Results from the Amyloidosis Research Consortium's 2022 Community Survey

Sabrina Rebello[1], Kristen Hsu[1], Sascha A. Tuchman[2], Brett W. Sperry[3], Mathew S. Maurer[4], Raymond L. Comenzo[5], Lisa Mendelson[6], Hamza Hassan[6], Isabelle Lousada[1]

[1]Amyloidosis Research Consortium, Boston, MA, USA; [2]University of North Carolina, Chapel Hill, NC, USA; [3]Saint Luke's Mid America Heart Institute, Kansas City, MO, USA; [4]Columbia University, New York, NY, USA, [5]Tufts Medical Center, Boston, MA, USA, [6]Amyloidosis Center, Boston University Chobanian & Avedisian School of Medicine and Boston Medical Center, Boston, MA, USA.

BACKGROUND

- Amyloidosis is a rare and often fatal disease caused by the inappropriate folding of a protein into insoluble protein fibrils forming amyloid deposits. Amyloid fibrils collect in various tissues and organs, causing damage.
- Transthyretin amyloidosis (ATTR) occurs when the protein, transthyretin, becomes unstable, misfolds, and deposits in the heart, nervous, and musculoskeletal system. ATTR amyloid can be categorized into two types: hereditary variant (ATTRv) and wild-type (ATTRwt) with primary organ involvement of cardiomyopathy (CM) or peripheral neuropathy (PN).
- Heart involvement and cardiomyopathy are common in ATTR, but many different symptoms affecting patients in a variety of different ways and organs leading patients to seek medical attention from a variety of medical disciplines and many have to see multiple medical professionals before receiving a definitive diagnosis. Diagnosis and treatment of amyloidosis has historically been primarily at larger academic institutions where one or a team of clinicians either specialize or have experience treating patients with amyloidosis. These Specialized Amyloidosis Centers provide a benefit of experience and ability to recognize the signs of ATTR and most have a multi-disciplinary team to address the wide range of symptoms. The small number of these centers and the ability of patients to have to travel and be seen at these centers can pose a burden to many.
- With the first treatment for ATTR-CM approved in 2018, there has been an increase in initiatives to raise disease awareness among cardiologists and throughout the larger medical community.

OBJECTIVE

- To determine if there have been improvements in disease awareness by examining the changes in where amyloidosis patients have been diagnosed.

METHODS

- The Amyloidosis Research Consortium (ARC) conducted an online survey in patients with amyloidosis and caregivers in April and May 2022.
- Data collected included demographics, disease characteristics, and the pathway to diagnosis.
- Specialized Amyloidosis Centers were defined based on their many years of experience, multidisciplinary care, and high numbers of patients treated as evaluated previously by ARC and recognized independently by the International Society of Amyloidosis. This included 23 specialized centers across the globe. All diagnoses at a center are included in the current categorization of the specialized centers.
- Wilcoxon rank sum test and Pearson's chi-squared were used to evaluate differences in demographic, disease characteristics and amyloidosis care ratings by amyloidosis specialized centers and non-specialized centers.

RESULTS

Demographics

- Of the 597 ATTR patients and caregivers included in this analysis, 370 (62%) had ATTRwt, 554 (93%) lived in North America, 402 (68%) were male, 546 (91%) were white, and mean age was 72 years.
- Demographic and socioeconomic status were largely similar of patients diagnosed at a Specialized Amyloidosis Center versus not. (Table 1)
- 214 (36%) were diagnosed at Specialized Amyloidosis Center and 357 (60%) were diagnosed in 2019 or later.
- Gender, race, age, income, retirees, and use of Medicare insurance were similar between the two groups.
- More highly educated patients were diagnosed at a Specialized Amyloidosis Center (79% with college or higher degree vs. 70%, p=0.032).
- Of the amyloidosis subtypes, ATTRwt was the more common ATTR subtype at non-specialized centers (66% vs 56%, p=0.017).

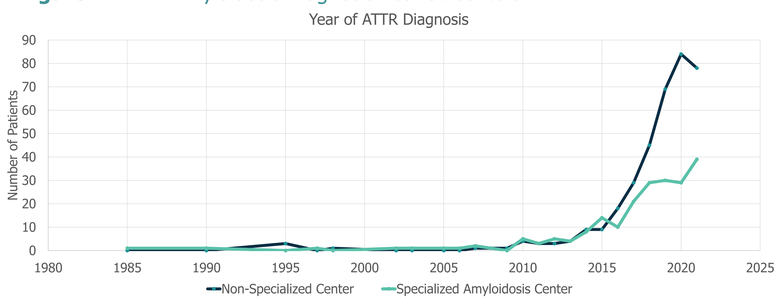
Table 1. Demographic Characteristics of ATTR Respondents

	ATTR	Non-Specialized Center	Specialized Amyloidosis Center	
	N = 597	N = 383	N = 214	p-value
Role				0.4
Caregiver	115 (19)	78 (20)	37 (17)	
Patient	482 (81)	305 (80)	177 (83)	
Region				0.3
Asia-Pacific	10 (1.7)	8 (2.1)	2 (0.9)	
Europe	31 (5.2)	16 (4.2)	15 (7.0)	
North America	554 (93)	358 (93)	196 (92)	
South America	2 (0.3)	1 (0.3)	1 (0.5)	
Gender (Male)	402 (68)	252 (66)	150 (70)	0.6
Age, mean(SD)	72.24 (10.66)	72.57 (10.76)	71.67 (10.48)	0.13
Race (White)	546 (91)	349 (91)	197 (92)	0.7
Education (College or Higher)	390 (73)	235 (70)	155 (79)	0.032
Retired	437 (73)	278 (73)	159 (74)	0.7
Insurance (Medicare)	445 (84)	285 (84)	160 (82)	0.6
Wild-type ATTR	370 (62)	251 (66)	119 (56)	0.017
Diagnosed 2019 or Later	357 (60)	252 (66)	105 (49)	<0.001

ATTR Amyloid Disease Characteristics – Year of ATTR Diagnosis

- Less than half of the patients [105 (49%)] diagnosed at a Specialized Amyloidosis Center were diagnosed 2019 or later compared to 252 (66%) of patients at a non-specialized centers were diagnosed 2019 or later. (Table 1)
- In the last four years, the number of patients diagnosed at a non-specialized center has increased with more recent years seeing more than double of diagnoses at non-specialized centers.
- Of patients diagnosed in 2019 or later, 105 (29%) were diagnosed at a Specialized Amyloidosis Center. (Figure 1)

Figure 1: ATTR Amyloidosis Diagnosis Year at Centers



ATTR Amyloid Disease Characteristics

- Heart organ involvement, the number of doctors seen prior to receiving a diagnosis, time from symptom onset to diagnosis were not different based on diagnosis at a specialized center or not. Age at diagnosis was slightly lower at specialized centers (mean 69 vs 70 years, p=0.045) and time since diagnosis was 5 years vs 3 years (p<0.001). (Table 2)

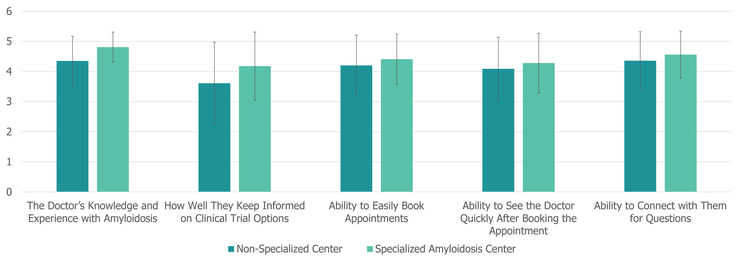
Table 2: Disease and Diagnostic Characteristics of ATTR Amyloidosis Patients

	ATTR	Non-Specialized Center	Specialized Amyloidosis Center	
	N = 597	N = 383	N = 214	p-value
Age at Symptom Onset, mean (SD)	65.61 (13.15)	65.60 (13.64)	65.62 (12.40)	0.6
Total Time from Symptom Onset, mean (SD)	7.92 (7.67)	7.79 (7.94)	8.13 (7.24)	0.13
Age at Diagnosis, mean (SD)	69.55 (11.59)	70.13 (11.81)	68.54 (11.17)	0.045
Time Since Diagnosis, mean (SD)	3.91 (4.05)	3.43 (3.45)	4.76 (4.84)	<0.001
Time from Symptom Onset to Diagnosis, mean (SD)	3.96 (7.26)	4.34 (7.59)	3.36 (6.69)	0.11
Testing for Diagnosis - Biopsy	249 (45)	134 (40)	115 (54)	0.001
Testing for Diagnosis - Imaging	417 (76)	264 (78)	153 (71)	0.068
Heart Involvement	520 (87)	339 (89)	181 (85)	0.2
Doctors Seen Before Being Diagnosed with ATTR, mean (SD)	3.08 (2.19)	3.07 (2.07)	3.09 (2.36)	0.3

Patient Rating of Treating Amyloidosis Center and Doctor

- On a scale of 1-5 (1=Poor, 5=Excellent) patients were asked to rate the place they go for amyloidosis care and treatment. Most patients rated well the place they go for ATTR care. The largest differences in mean ratings was about a half point difference in the rating of the doctor's knowledge and experience with amyloidosis and in how well they keep the patient informed on clinical trial options (p<0.001). All rating were higher for patients being seen at Specialized Amyloidosis Centers. (Figure 2)

Figure 2. Mean Patient Rating of Their Treating Center for ATTR Amyloidosis



CONCLUSIONS

- The broader awareness within the medical community of ATTR amyloidosis has allowed patients to be diagnosed and receive treatment at a wider range of centers. This trend is increasing, and twice as many patients were diagnosed at non-specialty centers compared with specialty centers from 2019-2021.
- Patients are still having to see multiple doctors before receiving an ATTR amyloidosis diagnosis and the time from symptom onset to diagnosis is the similar.
- While patients are able to get amyloidosis diagnoses and treatment at more and more centers, the specialized centers do have higher patient ratings in knowledge and experience in amyloidosis as well as keeping patients informed of clinical trial options.
- Further efforts are needed to increase awareness across all types of amyloidosis and to reduce the time to diagnosis from symptom onset.

ACKNOWLEDGEMENTS: Funding for this research was provided by ARC. The study team would like to thank the patients and caregivers who participated in this research, the experts who offered their time and insights towards its design.

DISCLOSURES: **MSM** has grant support from NIH R01HL139671; consulting income from Eidos, Prothena, Ionis, Alnylam, Novo-Nordisk and Intellia; and institutional support in the form of clinical trial funding from Pfizer, Attralus, Ionis, Eidos and Alnylam. **BWS** is a consultant for Pfizer, Alnylam and Eidos/BridgeBio and a speaker for Pfizer.

Presented at ISPOR 2023 May 7-10, 2023 | Boston, MA, USA