Live birth rates by infertility treatment in women with and without multiple sclerosis

MK Houtchens,¹ NC Edwards,² B Hayward,³ AL Phillips³

Aae

31-34

35-37

38-40

41-42

43-55

Midwest

Northeas

Insurance, n (%)

Comorbidity, n (%)

Chronic lung disease

Gastrointestinal disorder

Due to missing values, the percer

MS, multiple sclerosis: SD, standard deviation.

Alcohol abuse

Commercia

Medicaid

Medicare

Other

Anxiety

Arthritis

Depression

Hyperlipidemia

Hypertension

Thyroid disease

Diabetes

Median

18-30

31-34

35-37

38-40

41-42

43-55

Midwest Northeas

South

West

Insurance, n (%)

Comorbidity, n (%)

Chronic lung diseas Depression Diabetes

Gastrointestinal disorder

Due to missing values, the perce

Alcohol abuse

Hyperlipidemia

-lypertensior

Thyroid disease

Commercia

Medicaid

Medicare

Anxiety

Arthritis

Other

Geographic region, n (%)

South

West

Geographic region, n (%)

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INTRODUCTION

- Multiple sclerosis (MS) is three times more common in women than in men,¹ and the clinical onset is often during childbearing years.²
- Reproductive issues are important considerations for many women with MS.³
- Data regarding infertility treatment and live birth rates (LBRs) in women with MS are lacking.
- The availability of health services utilization data, commonly referred to as administrative claims data, affords a unique opportunity to gain insight into the patient experience of care in patients with MS across large, 'real-world' populations.4
- A better understanding of the real-world outcomes of women with MS receiving infertility treatment is essential to improve available clinical support, healthcare services, and quality of life for this population.

OBJECTIVE

 To compare infertility treatments and LBRs between women with and without MS based on data from a US retrospective commercial claims analysis.

METHODS

Data description

- This was a retrospective administrative claims database study using IMS Health Real World Data Adjudicated Claims – US data from January 1, 2006 to December 31, 2015.
- The database comprises complete, adjudicated, plan-level data including complete inventory of patients' prescriptions, inpatient hospital claims. and outpatient medical claims.
- The database consists primarily of commercial preferred provider organization plans.
- Variations in treatments between the infertility practices and in the coverage of infertility benefit among different plans may not be appropriately reflected in the individual claims.
- Administrative claims databases provide information on patients with health insurance, and so findings may not be generalizable to patients undergoing in vitro fertilization who self-pay.
- Approximately 150 million individuals with a medical benefit, and a subset of 95 million individuals with both medical and pharmacy benefits, are included in the database

Study population

 Data were used to identify a cohort of US women with MS (International Classification of Diseases, Ninth Revision, Clinical Modification [ICD-9-CM] diagnosis code: 340.xx), aged 18-55 with a minimum of 1 year of continuous insurance eligibility.

Infertility treatments utilized

- The following treatments were included in the analysis:
- Oral infertility medications only, defined as clomiphene and/or letrozole and no gonadotropin (Gn)
- Injectable medications for controlled ovarian stimulation (COS), defined as ≥1 Gn injection and an ovulation trigger, either human chorionic Gn or Gn-releasing hormone agonist

Data analysis

- Patients with MS were matched 1:1 to a pool of patients without MS using exact matching.
- Matched characteristics were age group, census region, and index-year guarter.
- For descriptive (i.e. unadjusted) analyses. categorical and binary variables were summarized using frequencies and percentages.
- Pairwise chi-square tests were conducted to evaluate significant differences in the prevalence of infertility diagnosis and treatments between patients with and without MS

RESULTS

Sample selection

- The number of women with MS treated with oral infertility medications who met the eligibility criteria was 672, versus 11,982 without MS.
 - Propensity score matching controlled for baseline age, geographic region, and index-year quarter (n=609 patients in each group).
- The number of women treated with injectable COS medications who met the eligibility criteria was 281 with MS and 4868 without MS.
 - The number of patients in each group after propensity score matching was 268

Baseline characteristics

- Patient demographics and clinical characteristics for the original unmatched cohort of patients taking oral medication are presented in Table 1
- Patient demographics and clinical characteristics for the matched cohort taking oral medication are presented in Table 2.
- Patient demographics and clinical characteristics for the original unmatched cohort of patients taking injectable medication are presented in Table 3.
- Patient demographics and clinical characteristics for the matched cohort taking injectable medication are presented in Table 4

patients with and without MS taking oral medications (unmatched cohort)			
	Patients with MS (n=672) ^a	Patients without MS (n=11,982) ^a	
ge			
n	672	11,982	
Mean (SD)	35.74 (9.45)	33.28 (9.13)	

Table 1. Demographic and clinical characteristics of

Ac

Median

Age grouping, years, n (%)		
18–30	237 (35.3)	5742 (47.9)
31–34	144 (21.4)	2126 (17.7)
35-37	71 (10.6)	1060 (8.8)
38-40	37 (5.5)	702 (5.9)
41-42	16 (2.4)	262 (2.2)
43-55	167 (24.9)	2090 (17.4)
Geographic region, n (%)		
Midwest	200 (30.3)	3538 (30.2)
Northeast	199 (30.2)	2716 (23.2)
South	209 (31.7)	4115 (35.1)
West	52 (7.9)	1358 (11.6)
Insurance, n (%)		
Commercial	440 (65.5)	8129 (67.8)
Medicaid	8 (1.2)	120 (1.0)
Medicare	3 (0.4)	17 (0.1)
Other	221 (32.9)	3716 (31.0)
Comorbidity, n (%)		
Alcohol abuse	13 (1.9)	171 (1.4)
Anxiety	223 (33.2)	2981 (24.9)
Arthritis	120 (17.9)	1429 (11.9)
Chronic lung disease	150 (22.3)	1808 (15.1)
Depression	219 (32.6)	2631 (22.0)
Diabetes	80 (11.9)	1156 (9.6)
Gastrointestinal disorders	298 (44.3)	4241 (35.4)
Hyperlipidemia	198 (29.5)	3128 (26.1)
Hypertension	176 (26.2)	2418 (20.2)
Thyroid disease	213 (31.7)	2851 (23.8)

MS multiple sclerosis: SD, standard deviation

*Due to missing values, the percentages presented in the table may be inconsistent with the

Table 2. Demographic and clinical characteristics of matched cohorts of patients with and without MS taking oral medications

Patients with MS Patients without MS

	(n=609) ^a	(n=609)ª
Age		
n	609	609
Mean (SD)	35.16 (9.25)	34.72 (9.69)
Median	33	32
Age grouping, years, n (%)		
18–30	229 (37.6)	243 (39.9)
31–34	130 (21.3)	126 (20.7)
35–37	66 (10.8)	65 (10.7)
38–40	36 (5.9)	22 (3.6)
41-42	15 (2.5)	12 (2.0)
43–55	133 (21.8)	141 (23.2)
Geographic region, n (%)		
Midwest	185 (30.4)	195 (32.0)
Northeast	172 (28.2)	165 (27.1)
South	200 (32.8)	192 (31.5)
West	52 (8.5)	57 (9.4)
Insurance, n (%)		
Commercial	397 (65.2)	414 (68.0)
Medicaid	7 (1.1)	4 (0.7)
Medicare	3 (0.5)	3 (0.5)
Other	202 (33.2)	188 (30.9)
Comorbidity, n (%)		
Alcohol abuse	13 (2.1)	7 (1.1)
Anxiety	199 (32.7)	132 (21.7)
Arthritis	106 (17.4)	89 (14.6)
Chronic lung disease	134 (22.0)	98 (16.1)
Depression	197 (32.3)	137 (22.5)
Diabetes	70 (11.5)	59 (9.7)
Gastrointestinal disorders	273 (44.8)	200 (32.8)
Hyperlipidemia	169 (27.8)	187 (30.7)
Hypertension	153 (25.1)	135 (22.2)
Thyroid disease	185 (30.4)	157 (25.8)

MS, multiple sclerosis; SD, standard deviation.

Table 3. Demographic and clinical characteristics of patients with and without MS receiving injectable infertility medications (unmatched cohort)			
	Patients with MS (n=281) ^a	Patients without MS (n=4868) ^a	
Age			
n	281	4868	
Mean (SD)	33.30 (4.74)	32.11 (5.28)	
Median	33	32	
Age grouping, years, n (%) 18–30	87 (31.0)	1961 (40.3)	

80 (28.5)

56 (19.9)

41 (14 6)

11 (3.9)

6 (2.1)

110 (40.1)

96 (35.0

55 (20.1)

13 (4.7)

198 (70.5)

0(0)

1 (0.4)

82 (29.2

1 (0.4)

71 (25.3)

28 (10.0)

55 (19.6)

76 (27.0)

24 (8.5)

105 (37.4)

61 (21.7)

54 (19.2)

67 (23.8)

matched cohorts of patients with and without

(n=268)^a

Table 4. Demographic and clinical characteristics of

MS receiving injectable medications

nted in the table may

115 (2.4)

1940 (40.5)

1497 (31.2)

1038 (21.7)

316 (6.6)

3409 (70.0)

4 (0.1)

11 (0.2)

1444 (29.7)

44 (0.9)

1086 (22.3)

324 (6.7)

674 (13.8

938 (19.3)

340 (7.0)

1457 (29.9)

972 (20.0)

660 (13.6)

1280 (26.3)

(n=268)^a

51 (19.0)

17 (6.3)

68 (25.4)

49 (18.3)

27 (10.1

72 (26.9)

sistent with the

oneietent with the

ents without MS (n=4868) ^a		infertility medications
4868		women with MS and without MS.
32.11 (5.26) 32	•	The mean (SD) dura
1961 (40.3) 1305 (26.8) 785 (16.1)		women treated with i was 4.29 (2.49) year 4.24 (2.46) years for
518 (10.6) 184 (3.8)	•	LBRs for women trea

- LBRs for women treated with oral infertility medications were similar in women with and without MS (32.18% vs 31.52%, respectively; p=0.8536; Figure 1)
- The difference in LBRs for women treated with injectable COS medications of 5.22% (44.03% vs 49.25% for women with and without MS, respectively; p=0.2603) did not reach statistical significance (Figure 2).



t of patients receiving medications n=0.4336 45.9 Infertility diagnosis

Gn, gonadotropin; GnRH, gonadotropin-releasing hormone; LBR, live birth rate; MS, multiple sclerosis.

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rall N MS. multiple sclerosis: SD. standard deviation

Mean (SD) 33.32 (4.76) 32.42 (5.09) 33 Age grouping, years, n (%) 84 (31.3) 98 (36.6) 76 (28.4)

51 (19.0)

40(14.9)

11 (4.1)

6 (2.2)

109 (40.7)

92 (34.3

54 (20 1)

13 (4.9)

188 (70.1)

0 (0)

1 (0.4)

79 (29.5)

1(0.4)

69 (25.7)

26 (9.7)

53 (19.8)

72 (26.9)

23 (8.6)

102 (38.1)

58 (21.6)

50 (18.7)

65 (24.3)

nted in the table

Patients with MS Patients without MS

72 (26.9)	EBR, no brando, no, nalipio obciolo.	
36 (13.4) 8 (3.0) 4 (1.5)	Figure 2. Infertility diagnos the matched coho injectable infertili	si Si it
106 (39.6) 101 (37.7) 51 (19.0) 10 (3.7)	p=0.3501 100 - 97.4 95.5	
188 (70.1)	80 -	
0 (0) 0 (0) 80 (29.9)	≈ 60 - 51.9	5
1 (0.4) 57 (21 3)		
9 (3.4) 34 (12.7)	20 -	



Infertility medications and LBRs

- The mean (standard deviation [SD]) duration of follow-up available for women treated with oral was 4.41 (2.53) years for 4.48 (2.60) years for women
 - ation of follow-up available for niectable COS medications rs for women with MS and women without MS.



LIMITATIONS

- Claims data are not specifically collected for research purposes and diagnostic and drug use information may not always be validated; as such. there can be missing information that limits the inferences that can be made from the data
- The ICD-9-CM code for systemic MS does not distinguish between different MS types (e.g. primary progressive MS, relapsing-remitting MS, and secondary progressive MS).
- · Administrative claims databases provide information on patients with health insurance administered by regional health plans in the US; thus, results may not be generalizable to patients who self-pay or patients without employer-sponsored commercial health insurance

CONCLUSION

 LBRs for women with MS receiving infertility treatment did not statistically significantly differ compared with women without MS receiving infertility treatment; however, further research in a larger patient population is warranted.

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