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Geographic Variations in Biologic Therapy and Disease Characteristics: A Pilot-Study in the Corrona Psoriasis Registry

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The American Academy of Dermatology and the National Psoriasis Foundation recently published extensive guidelines for the management of psoriasis with biologics.[1] However, little is known about geographic variation in the use of these medications. The Corrona Psoriasis Registry is a prospective, multi-center, non-interventional registry for patients with psoriasis under the care of a dermatologist with sites across the United States (Figure 1a). Here, in a pilot analysis of 2018 Corrona data, we investigated geographic variations, based on US Census Divisions, in biologic use by class and patient disease characteristics.

There were 2896 newly enrolled patients on biologic therapy in 2018: 1691 initiated biologic therapy at/after enrollment (initiators) and 1205 had started biologic treatment up to 12-months prior to enrollment (prevalent users). Of the newly enrolled, 24.5% were in the Northeast (NE), 14.4% in East North Central, 11.9% in Mountain-West North Central, 17.8% in South Atlantic, 10.7% in East South Central (ESC), 9.5% in West South Central (WSC), and 11.2% in Pacific (Table 1). Mean age was 50.1 (SD=14.6) and the majority were Caucasian (80.0%), utilized private insurance (73.8%), and had BMI >30 kg/m^2 (52.6%). The most frequently reported comorbid diseases were hypertension (38.2%), hyperlipidemia (27.0%), and diabetes mellitus (16.4%). Mean duration of psoriasis was 14.3 (SD=13.1) years. Moderate disease by Body Surface Area (BSA, 3–10%) was the most commonly reported severity level (41.9%). 44% of patients starting therapy were biologic naïve.

Among geographic divisions, the ESC division had one of the highest frequencies of obesity (58.8%) and the largest frequencies of current smokers (24.5%), hypertension (44.8%), hyperlipidemia (33.2%), and diabetes mellitus (23.9%). The ESC also had the greatest frequency of very severe disease (BSA >20%) (22.6%) and the lowest proportion of biologic naïve patient drug starts (36.1%).

Biologic therapy varied geographically: overall, IL-17 inhibitors (IL-17i) were used the most frequently (44.5%) compared to IL-12/23i and 23i (35%) and TNF inhibitors (TNFi) (20%). The NE was the only region, overall, that utilized the IL-12/23i and 23i class more than the other classes (Figure 1b). When initiating biologic therapy at/after enrollment, TNFi and IL-17i were proportionally chosen more frequently in the ESC (29.1% and 49.8%, respectively) compared to the remaining census divisions; while the IL-12/23i and 23i were more frequent in the NE (48.9%) (Figure 1c). When considering those entering the registry as a prevalent user, the Pacific had the largest proportion on TNFi (35.9%), the ESC on IL-12/23i and 23i (42.5%), and the WSC on IL-17i (55.8%) (Figure 1d).

Limitations to this study are that the Corrona registry is not a random, population-based, representative sample; the registry cohort is comprised of patients invited to participate in the registry by their dermatologists. Regions are derived from the practice location, not patient home addresses. Some regions are underrepresented compared to others, and participating sites may not represent the true overall region.

Despite these caveats, little is known regarding the presence of geographic trends in both the use of biologics for psoriasis and the potential impact on patient outcomes.[2-4] The unadjusted analyses here suggest that in the US there are geographic variations in the use of biologic classes for the treatment of psoriasis. Interestingly, there were also geographic differences in psoriasis severity and prevalence of associated metabolic comorbid diseases. In support of these findings, we previously identified hot-spots of moderate-to-severe and severe psoriasis in the ESC among respondents to the 2016/2017 National Psoriasis Foundation Annual Surveys using geographic information systems.[5] This geographic trend is strengthened with the known relationship between psoriasis severity and metabolic syndrome[6] and the fact that the southern region of the US is burdened with a high prevalence of diabetes and metabolic disease.[7-8] How geographic variations in treatment patterns and disease characteristics ultimately impact patient outcomes will be a topic of future research. The Corrona Psoriasis Registry provides a unique opportunity to investigate these real-world trends.

FIGURE 1. Geographic variation of biologic class use in the Corrona Psoriasis Registry in 2018. (a) Distribution of Corrona Psoriasis Registry sites across the United States; (b) Frequencies of biologic class use overall; (c–d) Frequencies were also calculated for those initiating therapy at or post-enrollment (initiators), representing an active clinical decision, and for those who initiated therapy within 12 months prior to enrollment (prevalent users), representing an historical clinical decision. All patient initiations (with violation of independence assumption): (b) All initiations (prevalent and initiators at/after enrollment): Drug class vs region, $P<0.001$. (c) Initiators: Drug class vs region, $P<0.001$. (d) Prevalent users: Drug class vs. region, $P<0.001$. Additionally, Chi-square test was also performed for association at patient-level data, all $P<0.001$. TNF inhibitors included: certolizumab pegol, adalimumab, etanercept, and infliximab; IL-17 agents included: secukinumab, ixekizumab, brodalumab; IL-12/23 inhibitor included: ustekinumab; IL-23 inhibitors included: tildrakizumab, and guselkumab. Note that the IL-12/23 and IL-23 classes were combined for all analyses.

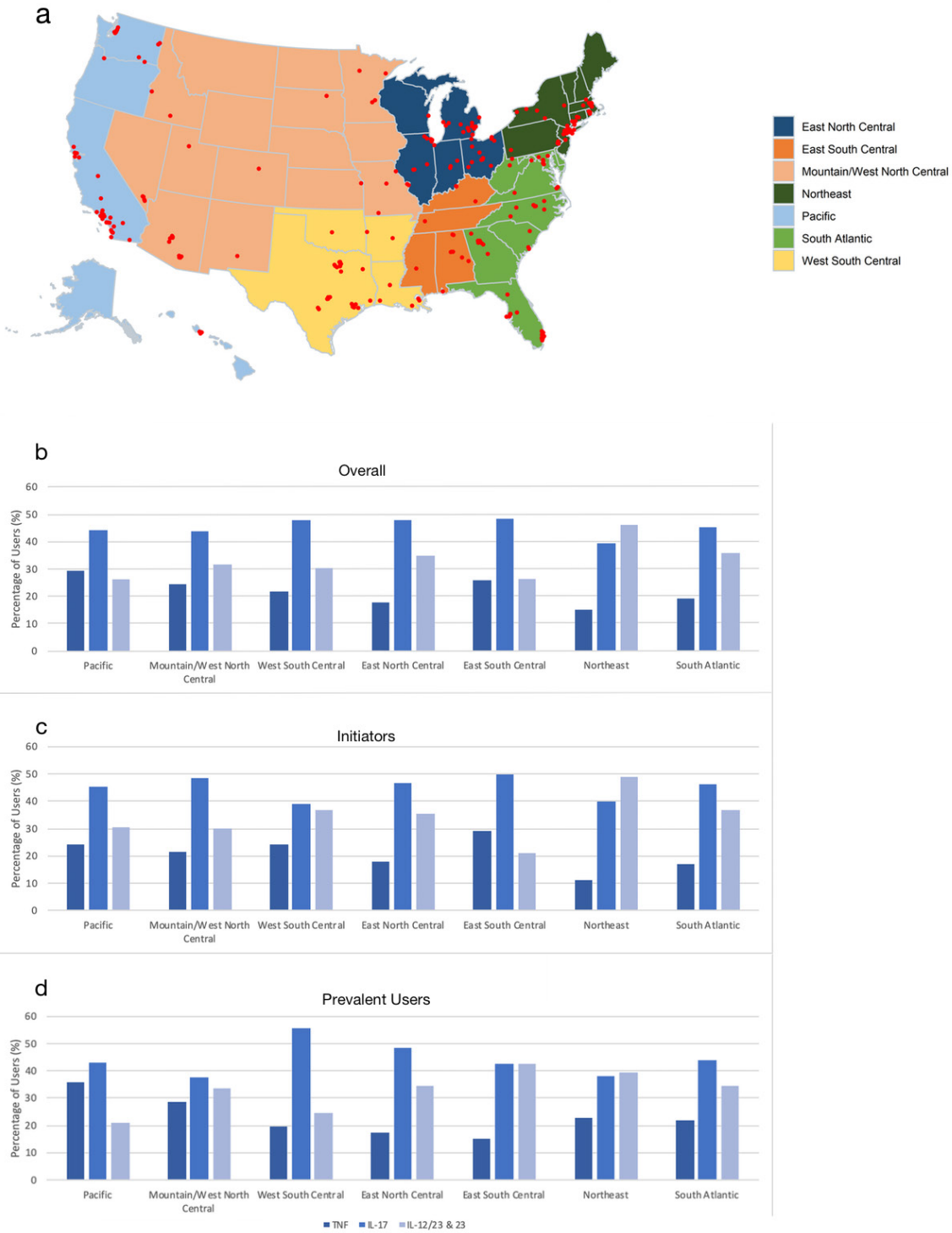

TABLE 1.

Characteristics of Newly Enrolled Patients in the Corrona Psoriasis Registry on a Biologic Therapy in 2018, by US Census Division

	Pacific	Mountain/ West North Central	West South Central	East North Central	East South Central	Northeast	South Atlantic	*P*-Value	Total
Total (N)	323	346	275	417	310	711	514	--	2896
Age, mean (SD)	49.9 (15.3)	49.9 (13.7)	48.7 (15.1)	49.9 (14.3)	49 (13.5)	50.5 (15.3)	51.0 (14.4)	0.380*	50.1 (14.6)
Female sex, n (%)	124 (38.4)	174 (50.3)	134 (48.7)	196 (47.0)	192 (61.9)	329 (46.3)	260 (50.6)	<0.001**	1409 (48.7)
Race, n (%)	--	--	--	--	--	--	--	<0.001^	--
White	136 (42.1)	289 (83.5)	220 (80.0)	384 (92.1)	296 (95.5)	567 (79.7)	426 (82.9)	--	2318 (80.0)
African American	6 (1.9)	9 (2.6)	18 (6.5)	7 (1.7)	11 (3.5)	45 (6.3)	50 (9.7)	--	146 (5.0)
Asian	116 (35.9)	13 (3.8)	0 (0)	15 (3.6)	0 (0)	52 (7.3)	11 (2.1)	--	217 (7.5)
Other	65 (20.1)	35 (10.1)	28 (10.2)	0 (0)	0 (0)	47 (6.6)	27 (5.3)	--	215 (7.4)
Hispanic, n (%)	50 (15.9)	32 (9.5)	68 (25.6)	0 (0)	0 (0)	62 (8.9)	73 (14.3)	<0.001**	306 (10.8)
Insurance, n (%)									
Private	193 (59.8)	263 (76.0)	219 (79.6)	311 (74.6)	213 (68.7)	531 (74.7)	406 (79.0)	<0.001**	2136 (73.8)
Medicare	63 (19.5)	52 (15.0)	47 (7.1)	77 (18.5)	59 (19.0)	127 (17.9)	85 (16.5)	0.787**	510 (17.6)
Medicaid	88 (27.2)	42 (12.1)	11 (4.0)	49 (11.8)	71 (22.9)	83 (11.7)	35 (6.8)	<0.001**	379 (13.1)
No insurance	9 (2.8)	7 (2.0)	0 (0)	13 (3.1)	0 (0)	6 (0.8)	25 (4.9)	<0.001**	72 (2.5)
Smoking history	--	--	--	--	--	--	--	<0.001^	--
Total (n)	318	341	268	413	310	696	503	--	1199
Never, n (%)	195 (61.3)	158 (46.3)	159 (59.3)	162 (39.2)	142 (45.8)	331 (47.6)	279 (55.5)	--	1426 (50.1)
Former, n (%)	71 (22.3)	109 (32.0)	73 (27.2)	158 (38.3)	92 (29.7)	265 (38.1)	154 (30.6)	--	922 (32.4)
Current, n (%)	52 (16.4)	74 (21.7)	36 (13.4)	93 (22.5)	76 (24.5)	100 (14.4)	70 (13.9)	--	501 (17.6)
Current Alcohol Use, n (%)	--	--	--	--	--	--	--	<0.001^	--
Total (n)	323	346	275	417	310	711	514	--	2896
None/Occasional	209 (64.7)	183 (52.9)	134 (48.7)	223 (53.5)	225 (72.6)	368 (51.8)	321 (62.5)	--	1663 (57.4)
Moderate	60 (18.6)	79 (22.8)	64 (23.3)	104 (24.9)	50 (16.2)	202 (28.4)	112 (21.7)	--	671 (23.2)
Daily	28 (8.7)	44 (12.7)	40 (14.5)	43 (10.3)	15 (4.8)	87 (12.2)	56 (10.9)	--	313 (10.8)
Multiple per day	26 (8.0)	40 (11.6)	37 (13.5)	47 (11.3)	20 (6.4)	54 (7.6)	25 (4.9)		249 (8.6)
BMI	--	--	--	--	--	--	--	<0.001^	--
Total (n)	319	338	270	414	306	703	508	--	1211
<25 (Underweight/ normal), n (%)	88 (26.7)	49 (14.5)	43 (15.9)	55 (13.3)	50 (16.3)	145 (20.6)	97 (19.1)	--	527 (18.4)
25-30 (Overweight), n (%)	107 (33.5)	86 (25.4)	78 (28.9)	120 (29.0)	76 (24.8)	214 (30.4)	147 (28.9)	--	828 (29.0)
>30 (Obese), n (%)	124 (38.9)	203 (60.1)	149 (55.2)	239 (57.7)	180 (58.8)	344 (48.9)	264 (52.0)	--	1503 (52.6)
Duration of Psoriatic Disease in years, mean (SD)	11.9 (11.9)	15.0 (12.8)	11.2 (11.8)	15.4 (13.6)	12.2 (11.6)	16.6 (14.1)	14.1 (13.1)	<0.001*	14.3 (13.1)
Age at Onset of Psoriatic Disease in Years, mean (SD)	38.0 (18.)	34.9 (17.1)	37.5 (16.6)	34.5 (17.3)	36.8 (16.7)	33.9 (17.7)	36.9 (17.2)	0.003*	35.8 (17.4)
BSA- Categorical	--	--	--	--	--	--	--	<0.001^	--
Total (n)	322	346	275	416	310	708	513	--	1221
Mild [0, 3), n (%)	92 (28.6)	131 (37.9)	103 (37.5)	156 (37.5)	102 (32.9)	172 (24.3)	147 (28.7)	--	903 (31.2)
Moderate [3, 10], n (%)	139 (43.2)	144 (41.6)	104 (37.8)	160 (38.5)	117 (37.7)	335 (47.3)	213 (41.5)	--	1212 (41.9)
Severe (10, 20), n (%)	46 (14.3)	29 (8.4)	27 (9.8)	26 (6.2)	21 (6.8)	74 (10.5)	63 (12.3)	--	286 (9.9)
Very severe [20, 100], n (%)	45 (14.0)	42 (12.1)	41 (14.9)	74 (17.8)	70 (22.6)	127 (17.9)	90 (17.5)	--	489 (16.9)

TABLE 1. (CONTINUED)

Characteristics of Newly Enrolled Patients in the Corrona Psoriasis Registry on a Biologic Therapy in 2018, by US Census Division									
	Pacific	Mountain/ West North Central	West South Central	East North Central	East South Central	Northeast	South Atlantic	P-Value	Total
Biologic Naïve, n (%)	153 (47.4)	145 (41.9)	134 (48.7)	221 (53.0)	112 (36.1)	288 (40.5)	220 (42.8)	<0.001**	1273 (44.0)
Comorbid Disease									
Total (N)	323	346	275	417	310	711	514	--	2896
Cancer	17 (5.3)	32 (9.2)	21 (7.6)	31 (7.4)	27 (8.7)	60 (8.4)	44 (8.6)	0.626**	232 (8.0)
Cardiovascular disease	22 (6.8)	34 (9.8)	33 (12.0)	37 (8.9)	34 (11.0)	58 (8.2)	48 (9.3)	0.374**	266 (9.2)
Hypertension	117 (36.3)	132 (38.2)	98 (35.8)	163 (39.1)	139 (44.8)	261 (36.7)	196 (38.1)	0.400**	1106 (38.2)
Hyperlipidemia	90 (28.0)	73 (21.1)	62 (22.6)	106 (25.4)	103 (33.2)	200 (28.1)	148 (28.8)	0.024**	782 (27.0)
Diabetes mellitus	52 (16.1)	60 (17.3)	36 (13.1)	66 (15.8)	74 (23.9)	114 (16.0)	73 (14.2)	0.036**	475 (16.4)
Crohn's disease	2 (0.6)	0 (0.0)	0 (0.0)	1 (0.2)	2 (0.6)	6 (0.8)	5 (1.0)	0.375**	16 (0.6)
Ulcerative Colitis	3 (0.9)	1 (0.3)	2 (0.7)	2 (0.5)	0 (0.0)	6 (0.8)	2 (0.4)	0.697**	16 (0.6)
Indeterminate IBD and other GI disorders	4 (1.3)	9 (2.6)	2 (0.7)	6 (1.4)	5 (1.6)	5 (0.7)	6 (1.2)	0.310**	37 (1.3)

*F-test from ANOVA adjusted for subject random effects. **Chi-square test with Donner adjustment for clustered data. ^Chi-square test from patient-level data

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