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Analysis of Wait Times for Online Dermatology Appointments in Most and Least Dermatologist-Dense Cities

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In the United States (US), there have been long wait times for new patient appointments and unequal geographic distribution of dermatologists.[1,2] Wait times for online dermatology appointment scheduling have not been previously characterized. ZocDoc is an online appointment scheduling marketplace hosting tens of thousands of independent practices and 60 hospitals.[3] Its "patient-centered search" uses data-driven algorithms to better match colloquial search terms with specialties and procedures. Our objective was to determine dermatology appointment wait times on ZocDoc based on dermatologist density.

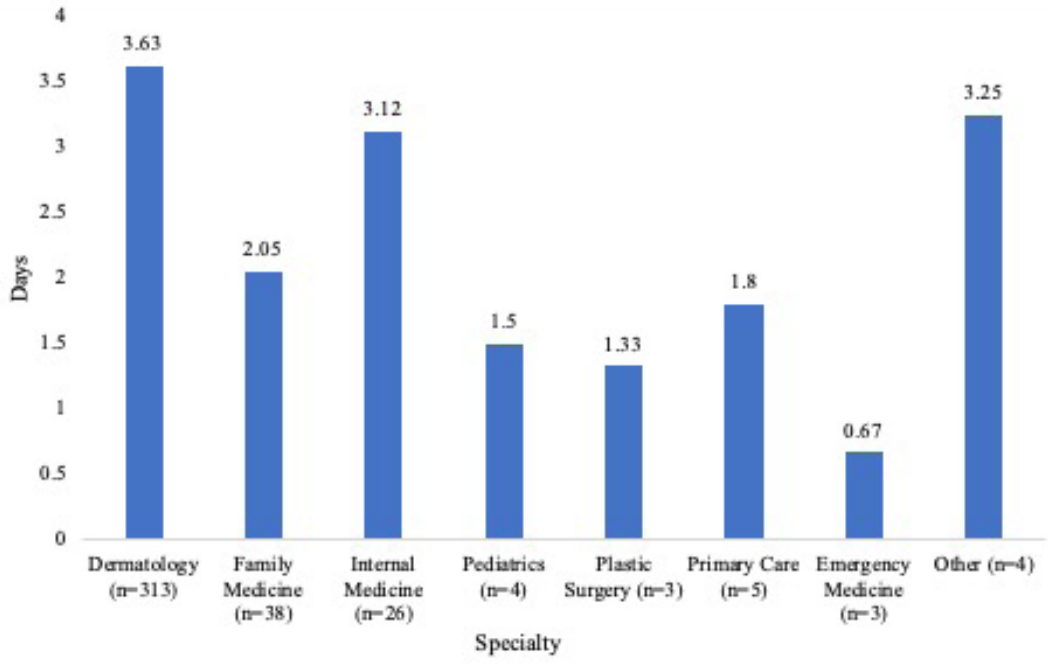
METHODS

In April 2019, searches for "dermatologist" were conducted on ZocDoc in chronological order of the most and least dermatologist-dense areas in the US as of 2016.[2] ZocDoc automatically filtered each search by "dermatology consultation". Searches were conducted in chronological order of dermatologist density and overlapping providers between cities were excluded from subsequent searches. Inactive and duplicate providers were also excluded. Provider characteristics were recorded along with next available appointment (days with only one available appointment were excluded), number of available days in May 2019, intervals of appointment times, and in-network insurances. Pearson correlation coefficients were calculated for various data points with significance set to α-level 0.05. Descriptive statistics were generated for means and frequencies. All data analyses were performed using Excel Data Analysis Toolpak.

RESULTS

A total of 552 providers were obtained for 20 searches on ZocDoc (Table 1), with 74% dermatologists. Palo Alto, CA had the largest percentage of non-dermatology providers (53%). Boston, MA (includes Middlesex, County, MA and Portland, ME) had the longest mean wait time (16.68 days). Overall mean wait times for the most and least dermatologist-dense locations were 4.60 and 5.90 days, respectively. Within high dermatologist-dense locations, dermatology had the longest mean wait time (3.63 days) of all specialties (Figure 1). For dermatologists in low dermatologist-dense locations, mean wait time was 6.24 days.

FIGURE 1. Mean wait times per specialty: From search results for "dermatologist" for most dermatologist-dense cities.[iii]



[i]Excludes providers from Boston, MA (includes Middlesex County, MA and Portland, ME) due to high number of outliers.

[ii]"Other" specialties include two sports medicine physicians, one addiction specialist and one cardiologist.

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Table 1. Characteristics of Search Results in Most and Least Dermatologist-Dense Locations

Density	1	2	3	4 (5 &10)	6	7	8	9
Location	**Upper East Side, NY**	**Palo Alto, CA**	**Santa Monica, CA**	**Boston, MA* (includes Middlesex County, MA & Portland, ME)**	**Lower Manhattan, NY**	**Hanover, NH**	**Bethesda & Rockville, MD**	**Annapolis, MD***
Providers, N	**N = 88**	**N = 75**	**N = 84**	**N = 58**	**N = 71**	**N = 0**	**N = 72**	**N = 5**
Specialty, N (%)								
Dermatology	86 (97.7)	35 (46.7)	74(88.1)	26 (44.8)	69 (97.2)		44 (61.1)	4 (80.0)
Family Medicine	1 (1.1)	22 (29.3)	1 (1.2)	16 (27.6)			13 (18.1)	1 (20.0)
Internal Medicine		12 (16.0)	5 (6.0)	3 (5.2)			9 (12.5)	
Pediatrics		2 (2.7)	1 (1.2)	2 (3.4)			1 (1.4)	
Plastic Surgery			3 (3.6)	1 (1.7)				
Primary Care				10 (17.2)	1 (1.4)		4 (6.9)	
Emergency Medicine/ Telemedicine	1 (1.1)	1 (1.3)			1 (1.4)			
Other								
Addiction		1 (1.3)						
Cardiology							1 (1.4)	
Sports Medicine		2 (2.7)						
Degrees, N (%)								
MD	84 (95.5)	62 (82.7)	79 (94.0)	48 (82.8)	67 (94.4)		66 (91.7)	5 (100.0)
DO	4 (4.5)	5 (6.7)	5 (6.0)	2 (3.4)	3 (4.2)		1 (1.4)	
NP		7 (9.3)		8 (13.8)			5 (6.9)	
PA		1 (1.3)			1 (1.4)			
ND								
Sex, N (%)								
Female	52 (59.1)	42 (56.0)	33 (39.3)	33 (56.9)	42 (59.2)		45 (62.5)	2 (40.0)
Male	36 (40.9)	33 (44.0)	51 (60.7)	25 (43.1)	29 (40.8)		27 (37.5)	3 (60.0)
In-network Insurances, N (%)								
Commercial	82 (93.2)	71 (94.7)	84 (100.0)	58 (100.0)	70 (98.6)		69 (95.8)	5 (100.0)
Commercial only	15 (17.0)	4 (5.3)	17 (20.2)	2 (3.4)	25 (35.2)		4 (5.6)	1 (20.0)
Medicare	67 (76.1)	67 (89.3)	67 (79.8)	56 (96.6)	45 (63.4)		67 (93.1)	4 (80.0)
Medicaid	14 (15.9)	4 (5.3)	1 (1.2)	17 (29.3)	23 (32.4)		13 (18.1)	
Self-pay only	3 (3.4)							
Unspecified	3 (3.4)	4 (5.3)			1 (1.4)		1 (1.4)	
Total number of languages represented	18	24	13	20	14		19	5
Total number of zip codes represented	13	36	41	30	13		36	5
	Mean (SD)	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**		**Mean (SD)**	**Mean (SD)**
Wait Time (days)	2.5 (2.7)	3.6 (3.2)	3.8 (4.4)	16.7 (14.4)	2.8 (3.4)		3.9 (3.9)	15.0 (10.3)
Number of Available Days in May 2019	13.6 (6.6)	16.8 (7.5)	14.9 (6.6)	5.3 (6.2)	13.5 (6.1)		14.0 (6.9)	6.6 (6.8)
Clinic Distance (mi)	0.8 (0.4)	18.3 (16.9)	12.1 (9.9)	11.4 (14.4)	1.0 (0.7)		9.2 (5.8)	45.0 (20.3)
Appointment Interval (mins)	21.0 (13.8)	16.4 (7.6)	17.9 (7.2)	19.0 (7.9)	16.9 (8.1)		23.0 (11.6)	11.7 (5.8)
Rating (out of 5)	4.7 (0.2)	4.7 (0.3)	4.76 (0.2)	4.8 (0.2)	4.7 (0.5)		4.7 (0.2)	4.7 (0.1)
Number of Reviews	459.7 (617.7)	129.3 (161.3)	123.2 (136.6)	93.0 (171.5)	668.2 (506.9)		256.0 (375.6)	265.6 (287.0)

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Table 2 cont'd. Characteristics of Search Results in Most and Least Dermatologist-Dense Locations

Density	703	704	705	706	707	708	709	710	711	712
Location	**Swainsboro, GA**	**Amarillo, TX**	**Flint, MI**	**South Bend, IN**	**Dayton, OH**	**Mojave, CA***	**Beaumont, TX**	**Yakima, WA**	**Lexing-ton, KY**	**Jamaica, NY***
Providers, N	**N = 0**	**N = 0**	**N = 24**	**N = 16**	**N = 9**	**N = 1**	**N = 15**	**N = 0**	**N = 0**	**N = 34**
Specialty, N (%)										
Dermatology			16 (66.7)	6 (37.5)	8 (88.9)		13 (86.7			31 (91.2)
Family Medicine			5 (20.8)	3 (18.8)	1 (11.1)		2 (13.3)			1 (2.9)
Internal Medicine			1 (4.2)	2 (12.5)						
Pediatrics										
Plastic Surgery										1 (2.9)
Primary Care			2 (8.3)	5 (31.3)		1 (100.0)				
Emergency Medicine/ Telemedicine										1 (2.9)
Other										
Addiction										
Cardiology										
Sports Medicine										
Degrees, N (%)										
MD			16 (66.7)	13 (81.3)	8 (88.9)		13 (86.7)			28 (82.4)
DO			8 (33.3)	1 (6.3)			1 (6.7)			4 (11.8)
NP					1 (11.1)	1 (100.0)	1 (6.7)			1 (2.9)
PA				2 (12.5)						1 (2.9)
ND										
Sex, N (%)										
Female			8 (33.3)	6 (37.5)	5 (55.6)	1 (100.0)	9 (60.0)			14 (41.2)
Male			16 (66.7)	10 (62.5)	4 (44.4)		6 (40.0)			20 (58.8)
In-network Insurances, N (%)										
Commercial			24 (100.0)	16 (100.0)	9 (100.0)	1 (100.0)	14 (93.3)			33 (97.1)
Commercial only			8 (33.3)			0	2 (13.3)			7 (20.6)
Medicare			18 (75.0)	16 (100.0)	9 (100.0)	1 (100.0)	12 (80.0)			26 (76.5)
Medicaid			6 (25.0)							19 (55.9)
Self-pay only										
Unspecified							1 (6.7)			1 (2.9)
Total number of languages represented			11	6	1	2	4			11
Total number of zip codes represented			17	7	6	1	8			18
			Mean (SD)	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**			**Mean (SD)**
Wait Time (days)			2.4 (3.7)	9.3 (10.1)	6.6 (9.3)	12.00	1.3 (1.8)			3.0 (2.4)
Number of Available Days in May 2019			14.7 (6.4)	9.7 (7.3)	11.4 (8.7)	7.0	15.5 (4.0)			12.8 (6.4)
Clinic Distance (mi)			46.2 (8.7)	68.4 (3.1)	60.7 (13.3)	16.5	69.9 (4.4)			4.7 (2.6)
Appointment Interval (mins)			23.0 (12.6)	24.0 (13.4)	25.3 (20.0)	22.5	17.2 (15.2)			11.7 (5.8)
Rating (out of 5)			4.7 (0.32)	4.8 (0.2)	4.9 (0.1)	5.0	4.7 (0.3)			4.6 (0.3)
Number of Reviews			118.7 (135.1)	140.3 (257.0)	105.4 (113.6)	53.0	469.9 (638.9)			395.2 (429.2)

*Overlapping providers between cities were excluded from subsequent searches done in chronological order by density of dermatologists. All search results for Middlesex, MA and Portland, ME overlapped with Boston, MA. Jamaica, NY had overlapping providers (with different clinic locations) with Upper and Lower Manhattan, NY. Mojave, CA had overlapping providers with Santa Monica, CA. Annapolis, MD had overlapping providers with Bethesda and Rockville, MD.

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There was no association between dermatologist density and wait times (r=0.1; *P*=0.01). As dermatologist density decreased, the mean clinic distance increased (r=-0.60; *P*<.00001) and as mean clinic distance increased, percentage of in-network Medicaid providers and language diversity decreased (r=-0.61and r=-0.79, respectively; *P*<.00001). Additionally, a positive correlation was found between dermatologist density and percentage of MD degree providers (r=0.60; *P*<.00001).

DISCUSSION

Wait times for dermatologists were much shorter on ZocDoc compared to the national mean wait time of 33 days in 2007.[1] These findings are consistent with a previous study reporting shorter wait times for primary care appointments on ZocDoc compared to phone call scheduling.[4] From our search for "dermatologist", one-fourth of providers were not dermatologists, and these providers had shorter wait times. This, may in turn, result in many patients receiving their dermatologic care from non-dermatologists, leading to inappropriate biopsies, missed diagnoses, and treatment failures. Additionally, some clinics were over 70 miles away, which may reflect a shortage of online provider representation or low dermatologist density. These factors may have contributed to the weak correlation between wait times and dermatologist density. Alternatively, dermatologist density may not be a good indicator of wait times for locations where neighboring areas are denser, such as Jamaica, NY.

Limitations of this study include ZocDoc's changing price structure from subscription to flat fees in select states.[5] For example, in New York, the fee is $35 per new patient for general dermatologists and $80 for procedural dermatologists. Several providers became inactive after data collection, thus highlighting a possible shift away from ZocDoc in some states.

In sum, ZocDoc scheduling allows for shorter wait times for dermatologic care, however this may lead to patients receiving diagnosis and treatment from providers who are not formally trained in dermatology with negative consequences.

DISCLOSURES

The authors have no conflicts of interest to declare.

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