

Direct and Indirect Patient Costs of Dermatology Clinic Visits and Their Impact on Access to Care and Provider Preference

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PRACTICE POINTS

- Physicians should be cognizant of the direct and indirect costs patients are subject to when attending dermatology clinic appointments and implement changes to reduce these costs.
- Telephone calls and secure email messaging are feasible alternatives shown to aid in clinical management and decrease the need for in-person care.
- Telecommunication may be used for the monitoring of chronic but stable conditions to reduce the number of follow-up visits.

The direct and indirect costs of dermatology clinic visits are infrequently quantified. Indirect costs, such as the time spent traveling to and from appointments and the value of lost earnings from time away from work, are substantial costs that often are not included in economic analyses but may pose barriers to receiving care. Due to the national shortage of dermatologists, patients may have to wait longer for appointments or travel further to see dermatologists outside of their local community, resulting in high time and travel costs for patients. Patients' lost time and earnings comprise the opportunity cost of obtaining care. A monetary value for this opportunity cost can be calculated by multiplying a patient's hourly wage by the number of hours that the patient dedicated to attending the dermatology appointment. Using a single institution survey, this study quantified the direct and indirect patient costs, including opportunity costs and time burden, associated with dermatology clinic visits to better appreciate the impact of these factors on health care access and dermatologic provider preference.

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Access to outpatient specialty care is notably limited due to time and out-of-pocket costs to patients, leading to patient dissatisfaction and worsened clinical outcomes. Lost time and earnings pose considerable opportunity costs for patients, with the total opportunity cost for all physician visits per year estimated at \$52 billion in 2010 in the United States.¹

The field of dermatology exemplifies the access issues patients may face when seeking specialty care given the ongoing national shortage of dermatologists and notably long wait times exceeding 60 days in major cities.²⁻⁴ With the high demand and limited number of providers, patients may have longer wait times to see dermatologists in their communities or have to travel further to see dermatologists in distant locations who have available appointments; therefore, patients may be subject to higher associated time, travel, and monetary costs. According to the 2013 Medical Expenditure Panel Survey, dermatology visits in the United States cost an average of \$221 per visit compared to \$166 for primary care. Dermatology visits had the highest median cost per office visit (\$124) and were more often associated with out-of-pocket expenses (60.7%) compared to other specialties.⁵ Despite these high costs, the number of dermatology visits is increasing each year, with more than 38 million dermatology visits in 2012.⁶

In light of these factors that limit patient access to dermatologists compared to other specialists, we performed an evaluation of the direct and indirect costs to patients visiting an outpatient dermatology clinic in Boston, Massachusetts, to better understand obstacles to receiving

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dermatologic care. The impact that time and money have on how patients prefer to receive their care also was evaluated. Conducting this study in Boston may best reflect patient barriers to obtaining dermatologic treatment, as nationwide surveys have found that Boston has the highest cumulative average wait times for physician appointments compared to other US metropolitan cities, with an average wait time of 72 days to see a dermatologist.⁴ New studies of patient costs associated with dermatology clinic visits are lacking, and existing economic analyses rarely include time costs. Understanding time burden and opportunity costs from the patient perspective may motivate patients and physicians to alter how they receive and provide health care, respectively, to minimize these expenses. Advances in health care technology such as telecommunication may facilitate these changes.

Methods

Study Design—This survey study took place from October 1, 2015, to March 4, 2016, at the department of dermatology outpatient clinic of Tufts Medical Center, an academic university hospital located in downtown Boston, Massachusetts, with no satellite clinics. Five general dermatologists, 2 dermatologic surgeons, and 9 dermatology residents comprised the dermatology department. The study protocol and questionnaire received exemption status from the Tufts University Health Science's institutional review board.

All adult patients (aged ≥ 18 years) attending a scheduled dermatology clinic visit within the designated time frame were invited to complete a questionnaire available in English, Spanish, or Chinese. Patients completed the questionnaire on paper or electronically using handheld tablets. Data were then compiled into the REDCap (Research Electronic Data Capture) online database. The questionnaire surveyed patient age; gender; ethnicity; language spoken; highest level of education; employment status; reason for visit (ie, skin condition); duration, cost, and mode of transportation; duration of visit including wait time; companion accompaniment; profession; hourly wage; and number of work hours requested off to attend the visit. Lastly, patients were surveyed on whether they prefer to receive dermatologic care at Tufts, to receive in-person care elsewhere, to use tele dermatology, or none of the above.

Statistical Analysis—Total time attributed to the visit was the sum of time for round-trip travel to and from the clinic, wait time, and face-to-face time with care providers. Out-of-pocket patient expenses included round-trip travel expenses, child care expenses, and direct payments such as deductibles and co-pays. Opportunity cost for employed patients was calculated as the patient's average hourly wage multiplied by either the number of hours taken off from work or the number of hours the patient attributed to the visit, whichever value was higher at the individual level. For the purpose of calculating opportunity costs, travel time, wait time, and face-to-face time

were imputed using average values for these variables when not reported. Patients could provide exact hourly wage and annual income or select the closest approximation from 10 wage ranges. For patients who selected a wage range, the midpoint of the range was used as the hourly wage. Total costs were the sum of reported out-of-pocket expenses and calculated opportunity costs. For unemployed patients and those who did not report employment status, hourly wage was assumed to be \$0, resulting in opportunity costs of \$0. Costs are tabulated for individual patients and analyzed in aggregate.

Differences in patient characteristics between those who preferred their current care provider versus those who preferred to seek care elsewhere or via tele dermatology were compared using the χ^2 and Student *t* test. A multivariate logistic regression was then performed to identify predictors of patient preference for their current provider. Potential predictors for regression model were time and cost variables as well as factors selected based on results from bivariate analysis. Data analysis was performed using statistical software.

Results

Demographics—Demographic data for respondents are outlined in Table 1. Of 145 patients who completed the survey, the majority had already seen a dermatologist for their presenting condition (87.4%), and were English speaking (96.5%), white (76.6%), employed (59.4%), and male (50.3%), with a mean age (SD) of 52.3 (18.1) years and education level of 4-year university or higher (64.7%). The most common reasons for dermatology clinic attendance were general skin checks (30.8%) and psoriasis (26.6%). A smaller proportion of patients (16.1%) presented for surgical visits. Other less common conditions that brought patients into the clinic included acne (6.3%), eczema (4.9%), and skin rash (2.8%).

The mean (SD) reported hourly wage of employed patients was \$36.60 (15.8). The most common reasons for unemployment were retirement (65.5% [38/58]), disability (10.3% [6/58]), and schooling (10.3% [6/58]).

Time Attributed to Attending Dermatology Clinic Visits—Time costs are reported in Table 2. Patients traveled to the clinic mainly by car (56.5% [78/138]) or train/subway (25.3% [35/138]). One in approximately 5 patients (21.3%) spent more than 1 hour traveling one-way to the clinic. Most patients waited less than 20 minutes to see their care providers. Face-to-face time with providers (ie, residents and attending physicians) ranged from less than 21 minutes to more than 1 hour, with a mean (SD) time of 36.8 (18.9) minutes.

Of the employed respondents, 76.5% (65/85) took off time from work for the appointment. Patients took a mean (SD) of 4.1 (2.4) hours off from work, which was considered sick pay (35%), paid time off (36.6%), or unpaid time (28.3%). The total mean (SD) time dedicated to attending the clinic appointment averaged 144.8 (60.47) minutes. On average, the time spent

TABLE 1. Patient Demographics

Characteristic	Response
Gender, % (n=143)	
Male	50.3
Female	49.7
Mean age (SD), y (n=128)	52.3 (18.1)
Ethnicity, % (n=143)	
White	76.6
Asian	12.4
Black	3.4
Hispanic	3.4
Other	4.1
Language(s) spoken, % (n=143) ^a	
English	96.5
Chinese	6.3
Spanish	5.6
Russian	0.7
Other	4.9
Highest level of education, % (n=142)	
Doctorate degree	7.0
Master's degree	17.6
Professional degree higher than 4-year university	5.6
4-year university	34.5
2-year university	19.0
Vocational school	2.8
High school or equivalent	8.5
Did not finish high school	4.9
Reason for clinic attendance, % (n=143) ^a	
General skin check	30.8
Psoriasis	26.6
Surgery	16.1
Acne	6.3
Eczema	4.9
Rash	2.8
Suture removal	0.7
Other	16.1
Employment status, % (n=143)	
Employed	59.4
Unemployed	40.6
Mean reported hourly wage (SD), \$ (n=61)	36.60 (15.8)

^aPatients were allowed to select more than 1 answer choice, resulting in percentages that equal more than 100%.

TABLE 2. Reported Time Costs Associated With Dermatology Visits

Factor	Mean Time Cost (SD), min
Round-trip travel time (n=137)	77.4 (44.0)
Wait time in clinic (n=101)	26.6 (13.56)
Face-to-face time with care providers (n=87)	36.8 (18.9)
Total time attributed to clinic visit ^a (n=82)	144.8 (60.47)
Time taken off work for employed patients (n=65)	246.0 (144.0)

^aTotal time attributed to clinic visit is the sum of travel time, wait time, and face-to-face time with care providers tabulated on an individual basis.

traveling for the clinic visit was double the amount of time spent with the care provider (77.4 vs 36.8 minutes).

Monetary and Opportunity Costs—The mean (SD) monetary cost associated with clinic attendance for employed patients who reported their wages was \$187.50 (103.2)(range, \$37.50–\$489), most of which was opportunity cost from loss of potential work income (mean [SD], \$144.30 [93.6]; range, \$27–\$432)(Table 3). Similar total and opportunity costs were found for employed patients using the imputed average wage. The mean (SD) total cost per visit for unemployed patients or those who did not report employment status was \$38.65 (103.6)(range, \$0–\$800), which was 4-times less than the cost per visit for employed patients. Mean (SD) and median one-way travel expenses were \$16.60 (40.5) and \$10, respectively. Mean (SD) and median reported costs for deductibles/co-pays were \$44.20 (66.1) and \$25, respectively. Only 2 patients reported child care costs, which were valued at \$65 and \$75.

Patient Provider Preference—The majority (59.3% [67/113]) of patients preferred their current care providers, whereas 33.6% (38/113) preferred providers closer to work, home, or in a different unspecified setting. Only 7.0% (8/113) of patients who answered this survey question would choose teledermatology over their current providers.

On multivariate logistic regression (Table 4), patients who had additional out-of-pocket costs were significantly less likely to prefer their current care provider compared to patients with no out-of-pocket costs (odds ratio [OR], 0.27; 95% confidence interval [CI], 0.10-0.71; *P*<.05). Opportunity costs were not a significant predictor of provider preference. For every minute the travel time

TABLE 3. Monetary Costs Associated With Dermatology Visits

Expense	Mean Cost (SD), \$	Median Cost (Range), \$
Out-of-pocket costs		
Deductibles/co-pay (n=43)	44.20 (66.1)	25 (10–400)
Travel expenses (one way)(n=97)	16.60 (40.5)	10 (0–400)
Opportunity cost for employed patients		
Reported wage (n=61)	144.30 (93.6)	126 (27–432)
Reported and imputed wage (n=85) ^a	139.00 (87.7)	117.80 (27–432)
Total cost		
Reported wage for employed patients (n=61)	187.50 (103.2)	179.90 (37.50–489)
Reported and imputed wage for employed patients (n=85) ^a	185.30 (104.3)	166.50 (36.60–512.50)
Unemployed/not reported (n=60)	38.65 (103.6)	28.96 (0–800)

^aImputed average values of travel time, wait time, and face-to-face time used when not reported.

TABLE 4. Logistic Regression Model of Predictors of Patient Preference for Current Dermatologic Provider

Factor	Adjusted OR	95% CI
Out-of-pocket costs		
No	Reference	
Yes	0.27	0.10-0.71
Round-trip travel time		
<60 minutes	Reference	
≥60 minutes	0.29	0.09-0.96
Education		
≤2 years of college	Reference	
≥4 years of college	3.29	1.23-5.26
Skin condition		
Noninflammatory	Reference	
Skin check	9.01	2.28-35.59
Inflammatory	1.54	0.45-5.26
Surgical	3.97	0.92-17.10

Abbreviations: OR, odds ratio; CI, confidence interval.

increased, the likelihood of preference for the current care provider decreased by 2% (OR, 0.98; 95% CI, 0.95–0.99), and patients who traveled 60 minutes or more round-trip were 71% less likely to choose current provider care

than those who traveled less than 60 minutes (OR, 0.29; 95% CI, 0.09-0.96; $P < .05$). Patients with higher education (≥4 years of college) were 3.29-times more likely to stay with their current care provider than those with lower education (≤2 years of college). Those presenting for skin checks also preferred the current provider more than those with noninflammatory skin conditions such as alopecia and warts (OR, 9.01; 95% CI, 2.28-35.59). Age and gender were not statistically significant predictors of patient provider preference.

Comment

Our study revealed that patients spend a substantial amount of time and money attending dermatology clinic appointments. Round-trip travel time exceeded 2 hours for 20% of patients and accounted for the majority of the total time attributed to the visit. Patients who were employed typically requested an average of 4 hours off from work, resulting in a mean (SD) opportunity cost of \$144.30 (93.6) due to lost wages. Direct costs such as co-pays, deductibles, travel expenses, and child care accounted for a smaller proportion of total costs. The study assumed a wage of \$0 for unemployed patients, thus underestimating the true costs of the visit for these patients whose time may otherwise have been spent on leisure, education, volunteerism, or other activities that contribute to individual and societal productivity. The total costs for unemployed patients reflected only direct costs, and thus were notably lower than those for employed patients.

Direct out-of-pocket costs and travel time negatively impacted provider preference. Patients with out-of-pocket costs were much less likely to stay with their current care

provider (OR, 0.27; 95% CI, 0.10-0.71), preferring to seek care closer to home/work or teledermatology services. Similarly, for each minute that travel time increased, preference for current care provider decreased by 2%. Those who traveled 60 minutes or more were 71% less likely than those who traveled less than 60 minutes to stay with their current provider when given other options for care. Opportunity costs did not affect provider preference, even though they far exceeded direct costs for employed patients. Perhaps opportunity costs are not as immediately apparent to patients as out-of-pocket costs and travel time, and thus they do not factor as heavily in provider preference.

Despite high time and monetary costs, the majority of patients (60%) still preferred their current care provider, especially those with 4-year university degrees or higher education level (OR, 3.29; 95% CI, 1.23-5.26) and those presenting for skin checks (OR, 9.01; 95% CI, 2.28-35.59). Patients with higher levels of education likely have higher incomes and thus may not be as adversely affected by direct and/or indirect visit costs. Patients presenting for skin checks may value continuity and prefer providers with whom they already have an established therapeutic relationship. Future studies are needed to analyze the impact of these nonmonetary factors on provider preference.

Seeking Alternative Care—Tufts Medical Center does not have satellite dermatology clinics, making it the only option for patients who wish to receive care within the Tufts hospital network. However, patients do have the option of visiting non-Tufts-affiliated dermatology clinics outside of the city. To our knowledge, no formal studies have been performed comparing wait times for dermatology appointments in suburban versus urban Boston areas; however, it has been reported that rural practitioners have longer wait times than urban dermatologists, possibly due to the fact that physicians tend to aggregate in metropolitan areas.² Thus, the potential for shorter wait times in the Boston metropolitan area may make it a more desirable location to receive care compared to more suburban or even rural areas of Massachusetts, but additional data are needed to substantiate this hypothesis. Additionally, health insurance restrictions, refractory or complex dermatologic conditions, and referring providers' preference may affect patients' decisions to seek care at a particular clinic. However, these factors do not alter our finding that those who travel long distances to our dermatology clinic are less likely to stay with their current provider if given the choice to seek care closer to home/work or utilize teledermatology services.

Prior studies have demonstrated patient preference and willingness to accept alternative modes of care delivery to reduce time and monetary costs associated with in-person medical visits.^{7,8} Dermatology patients at a clinic in Ontario, Canada, considered the time they spent attending the clinic to be even more burdensome than the monetary cost.⁷ Patients with nondermatologic

chronic diseases and high out-of-pocket costs would prefer email rather than a clinic visit as the first method of contact with care providers.⁸ The explosive growth of direct-to-consumer (DTC) teledermatology services in the last 10 years speaks to patient demand for alternative care delivery that saves time and money. Although telemedicine has been implemented in various specialties, including ophthalmology and neurology, one of the most common applications is teledermatology. With DTC teledermatology, patients can take photographs or videos using personal smartphones and communicate directly with care providers using mobile or online applications. More recent review articles have identified 22 to 29 DTC mobile and web-based teledermatology services, with costs varying from \$0 to \$250.⁹⁻¹¹ The median consultation fee of \$59 for DTC teledermatology services is substantially less than total visit costs for employed patients in our study.⁹ Teledermatology has become an accessible and affordable modality of care, though perhaps not yet fully optimized for quality of care.

With increasingly higher co-pays and high-deductible insurance plans, time and monetary factors play increasingly important roles in patient preference for specialty care providers,¹² as demonstrated by our study. Dermatologists can work with patients to reduce the costs of medical visits. Perhaps monitoring of chronic but stable conditions can be accomplished through telecommunication to reduce the number of follow-up visits. For instance, psoriasis patients enrolled in telemonitoring perceived savings of time and expenses through reduction of clinic visits, resulting in high patient satisfaction levels.¹³ Telephone calls and secure email messaging are other feasible alternatives shown to aid in clinical management and decrease the need for in-person care.^{8,14} Fewer unnecessary follow-up visits also means more availability for new patients and those with acute needs.

Barriers to obtaining care are not limited to dermatology and are pervasive across most medical specialties. Issues of patient time burden and out-of-pocket expenses are reflected in recent reports focused on quantifying these costs throughout ambulatory care visits and services such as colorectal, cervical, and breast cancer screenings.^{1,15-18} Similar to our findings, many of these studies also show high time and opportunity costs from the patient perspective. Expansion of telemedicine to reduce patient costs is becoming a viable option for many specialists, though low reimbursement rates restrict its widespread application.^{9,19} However, this obstacle is not impossible to surmount. One study found that offering teledermatology to Medicaid patients through their primary care providers significantly improved access, allowing for a 63.8% increase in the number of patients visiting a dermatologist ($P < .01$).²⁰ Currently, a total of 48 state Medicaid programs now cover telemedicine, and a growing number of states are requiring private insurers to cover telehealth services.²¹ As more dermatologists

adopt telemedicine practices, it may allow for better access as well as expanded insurance coverage.

Limitations—The results of our study are limited by the single-institution survey design. Patients were asked to complete the survey while still at the clinic visit to minimize recall bias. Because these patients actually attended their appointments, they might perceive the time and monetary costs associated with the visit to be less problematic than those who canceled their appointments or transferred care elsewhere; however, we were still able to detect a significant impact of time and monetary costs on provider preference in this cohort ($P < .05$). Larger studies in different geographic settings and other specialty clinics are needed to confirm our findings and to determine if nonmonetary factors such as specific diagnoses, length of time with a certain care provider, or patient socioeconomic status can modulate the impact of time and monetary costs on provider preference.

Conclusion

This study showed that patients expend a substantial amount of time and monetary costs to attend dermatology clinic visits. Data from the current and prior studies suggest that these costs affect patient provider preference for dermatologic care and may pose barriers to necessary medical care. Recognizing direct and indirect patient costs may drive critical changes in health care delivery, such as increased telecommunication utilization, the more cost-saving alternative. Telemedicine, when integrated appropriately, can help minimize expenses for patients while continuing to maintain a high level of care.

REFERENCES

1. Ray KN, Chari AV, Engberg J, et al. Opportunity costs of ambulatory medical care in the United States. *Am J Manag Care*. 2015;21:567-574.
2. Kimball AB, Resneck JS Jr. The US dermatology workforce: a specialty remains in shortage. *J Am Acad Dermatol*. 2008;59:741-745.
3. Resneck JS Jr, Lipton S, Pletcher MJ. Short wait times for patients seeking cosmetic botulinum toxin appointments with dermatologists. *J Am Acad Dermatol*. 2007;57:985-989.
4. Physician appointment wait times & Medicaid and Medicare acceptance rates. Merritt Hawkins website. <https://www.merrithawkins.com/2014-survey/patientwaittime.aspx>. Accessed February 15, 2017.
5. Machlin SR, Adams SA. Expenses for office-based physician visits by specialty, 2013. Agency for Healthcare Research and Quality website. https://meps.ahrq.gov/data_files/publications/st484/stat484.pdf. Published November 2015. Accessed February 15, 2017.
6. National ambulatory medical care survey: 2012 state and national summary tables. CDC website. www.cdc.gov/nchs/data/ahcd/namcs_summary/2012_namcs_web_tables.pdf. Accessed February 15, 2017.
7. Vignjevic PM, Hux JE, Fisher BK, et al. Monetary and nonmonetary costs to patients attending an ambulatory dermatology clinic. *J Cutan Med Surg*. 1999;3:188-192.
8. Reed M, Graetz I, Gordon N, Fung V. Patient-initiated e-mails to providers: associations with out-of-pocket visit costs, and impact on care-seeking and health. *Am J Manag Care*. 2015;21:E632-E639.
9. Peart JM, Kovarik C. Direct-to-patient teledermatology practices. *J Am Acad Dermatol*. 2015;72:907-909.
10. Fogel AL, Sarin KY. A survey of direct-to-consumer teledermatology services available to US patients: explosive growth, opportunities and controversy. *J Telemed Telecare*. 2017;23:19-25.
11. Kochmann M, Locatis C. Direct to consumer mobile teledermatology apps: an exploratory study. *Telemed J E Health*. 2016;22:689-693.
12. Helms AD. High-deductible health plans can ruin finances. Kaiser Health News website. <https://khn.org/news/high-deductible-health-plans-can-ruin-finances/>. Published April 6, 2015. Accessed February 15, 2017.
13. Fruhauf J, Schwantzer G, Ambros-Rudolph CM, et al. Pilot study on the acceptance of mobile teledermatology for the home monitoring of high-need patients with psoriasis. *Australas J Dermatol*. 2012;53:41-46.
14. Eisenberg D, Hwa K, Wren SM. Telephone follow-up by a midlevel provider after laparoscopic inguinal hernia repair instead of face-to-face clinic visit. *JSL*. 2015;19:e2014.00205.
15. Yabroff KR, Guy GP Jr, Ekwueme DU, et al. Annual patient time costs associated with medical care among cancer survivors in the United States. *Med Care*. 2014;52:594-601.
16. Yabroff KR, Davis WW, Lamont EB, et al. Patient time costs associated with cancer care. *J Nail Cancer Inst*. 2007;99:14-23.
17. Jonas DE, Russell LB, Sandler RS, et al. Value of patient time invested in the colonoscopy screening process: time requirements for colonoscopy study. *Med Decis Making*. 2008;28:56-65.
18. Shireman TI, Tsevat J, Goldie SJ. Time costs associated with cervical cancer screening. *Int J Technol Assess Health Care*. 2001;17:146-152.
19. Dorsey ER, Topol EJ. State of telehealth. *N Engl J Med*. 2016;375:154-161.
20. Uscher-Pines L, Malsberger R, Burgette L, et al. Effect of teledermatology on access to dermatology care among Medicaid enrollees. *JAMA Dermatol*. 2016;152:905-912.
21. Thomas L, Capistrant G. State telemedicine gaps analysis: coverage & reimbursement. Telehealth website. <http://www.mtelehealth.com/state-telemedicine-gaps-analysis-coverage-reimbursement/>. Published January 19, 2016. Accessed February 15, 2017.