Supply-and-Demand Discrepancy in Academic Pigmented Lesion Clinics
A Case for a New Health Care Delivery Model

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IMPORTANCE There is an increasing demand for a limited number of pigmented lesion clinic (PLC) visits at dermatology centers.

OBJECTIVE To determine the proportion of visits to PLCs that are more frequent (“additional screening”) than the recommended (“standard”) follow-up schedule and to determine if certain patient characteristics correlate with the demand for these visits.

DESIGN, SETTING, AND PARTICIPANTS A retrospective medical chart review of all PLC visits at an academic dermatology center from October 2010 to January 2012. A total of 609 patients associated with 1756 visits were identified. Of these, 25 patients associated with 26 visits were excluded owing to lack of melanoma diagnosis or risk factors, leaving 584 patients and 1730 visits. Diagnoses of these patients included in situ and invasive melanoma, dysplastic nevi, Spitz nevi, atypical nevus syndrome, family history of melanoma only, and other risk factors. The mean (SD) age was 48 (16) years, and 235 (40.2%) of the patients were male.

MAIN OUTCOMES AND MEASURES The proportion of additional screening visits compared with standard visits. Standard visits were defined as occurring at the following frequencies: annually for mildly dysplastic nevi, Spitz nevi, or solely family history of melanoma; biannually for the first year, then annually thereafter for moderately dysplastic nevi or atypical nevus syndrome; biannually for up to 3 years, then annually thereafter for severely dysplastic nevi or melanomas in situ; every 3 months for 2 years, biannually for the following 2 years, then annually thereafter for invasive melanoma.

RESULTS A total of 1400 visits (80.9%) were standard, 257 (14.9%) were for additional screening, and 73 (4.2%) were “problem focused.” Thirty percent of patients had at least 1 additional screening visit. The distribution of diagnoses among standard vs additional screening visits differed significantly, with “family history only” and “other risk factors” taking up a larger percentage of standard visits (15.1%) than the percentage of additional screening visits (8.9%), and all other diagnoses being better represented among additional screening visits \((P = .04)\). No particular patient characteristic described those who sought additional screening visits.

CONCLUSIONS AND RELEVANCE A substantial proportion of additional screening PLC visits exist and are desired by all patients with pigmented lesions. We propose alternative clinic models, such as diagnosis-specific, adjunctive fee-for-additional-service, and teledermatology clinics to meet patient needs while creating resources to expand PLC visits.
Melanoma is the most fatal of all skin cancers. Its incidence is on the rise in the United States, increasing from 7.9 per 100,000 people in 1975 to 23.6 per 100,000 in 2010. Treatment of melanoma constitutes a substantial health care burden. Patients with melanoma require regular follow-up examinations to screen for new melanomas and recurrences, and most patients are never discharged from clinic. Furthermore, melanoma has been shown to cause worry and distress to the patient, including worry about recurrence and death from melanoma. Dedicated pigmented lesion clinics (PLCs) in dermatology centers offer many services that appeal to patients with melanoma, including comprehensive total body skin examinations using cutting-edge adjunctive diagnostic tools, such as dermoscopy, and total-body digital photography, clinical trial opportunities, and multidisciplinary approaches. The increasing incidence of melanoma, the worry that accompanies the diagnosis, and the low patient attrition all contribute to a growing demand for visits to PLCs that is increasingly difficult to accommodate.

Based on hazard ratios for recurrence, suggested follow-up schedules for stage I-II malignant melanoma have been published, and other studies are currently under way to determine an ideal follow-up schedule. No strong evidence exists for follow-up recommendations for other diagnoses followed in PLCs, such as dysplastic nevus, atypical nevus syndrome, and Spitz nevus, but an annual medical history and physical examination are generally recommended. A recently published melanoma patient checklist, which includes a write-in section for the recommended follow-up schedule, may be useful in outlining expectations early. However, owing to the worry that often accompanies melanoma, patients may schedule extra screening visits in addition to what are generally considered standard follow-up screening intervals. These additional screening visits decrease clinic availability for new or standard patient visits. In this setting, it can be a challenge to balance patient desires with health care utilization concerns.

To investigate this phenomenon, we conducted a retrospective medical record review of patients seen in a PLC to determine the number of additional screening melanoma visits seen in a 2-year period in comparison with the number of standard visits. In addition, we sought to determine if the likelihood of having additional screening visits was affected by certain patient characteristics, such as severity of disease, history of more than 1 melanoma, and family history of melanoma. Finally, we compared the rate of biopsy and rate of malignant findings between standard and additional screening visits to evaluate the benefit and drawbacks of increased surveillance.

Methods

This study was approved by the Emory University institutional review board. By retrospective review of electronic medical records, we identified patients who were seen at the Dermatology PLC at Emory University from October 2010 through January 2012. Patients were classified as those having invasive melanoma, melanoma in situ (MIS), dysplastic nevi (ranging from mild to severe), atypical nevus syndrome, and Spitz nevi. For those patients with more than 1 diagnosis, the most severe diagnosis (the diagnosis with the most frequent standard follow-up schedule) was considered. All diagnoses were either proven by biopsy at Emory or by an outside dermatologist, or, in some rare cases, reported by the patient without a biopsy record. Also included in the study were some patients seen in the PLC who did not have a diagnosis of melanoma but had a family history of melanoma. Patients with multiple nevi or other risk factors for melanoma but no family history of melanoma and no diagnosis were included in the diagnostic category “other risk factors.”

For each patient, the most recent PLC visit that occurred between October 2010 and January 2012 was identified as his or her “sentinel visit.” We then reviewed each patient’s medical chart and recorded the dates of all PLC visits that occurred in the 2 years prior to that sentinel visit. The captured 2-year period of visits, therefore, was unique to each patient depending on the date of the sentinel visit. For each patient visit identified within his or her 2-year period, we recorded the date of visit, reason for visit, whether total-body digital photography was used, the number of biopsies performed, the result of biopsies, the number of actinic keratoses treated, and whether other dermatologic diagnoses were treated. In addition, we captured each patient’s demographic information, diagnoses, date of diagnoses, number of recurrences, history of blistering sunburn, history of tanning bed use, family history of melanoma (first-degree relative), and personal history of melanoma.

Prior to this study, the Emory Dermatology PLC established a standard follow-up schedule for melanomas and related diagnoses using the best evidence currently available. The 2 PLC clinicians at our institution (including 1 of us [S.C.C.]) advise all patients to follow these guidelines. We recommend that patients with mildly dysplastic nevi, Spitz nevi, or solely a family history of melanoma have annual visits; patients with moderately dysplastic nevi or atypical nevus syndrome have biannual visits for the first year following diagnosis, then annual visits thereafter; patients with severely dysplastic nevi or MISs have biannual visits for up to 3 years and annual visits thereafter; and patients with invasive melanoma have visits every 3 months for the first 2 years, every 6 months for the following 2 years, and annually thereafter. These screening visits include a total-body skin examination and, when indicated, a lymph node examination.

Based on this standard schedule, each patient visit was qualified as standard, additional screening, or problem-focused. Visits were qualified as standard if they were primarily for screening total-body skin examinations and were no more frequent than the standard follow-up schedule for the patient’s specific diagnosis. Visits were qualified as additional screening if they were primarily for screening total-body skin examinations and occurred more frequently than the standard follow-up visit schedule. Problem-focused visits were those that were for a specific new complaint and without a screening total-body skin examination. Problem-focused visits were further divided into 2 subcategories: “new...
or changing lesion” and “unrelated dermatologic complaints.” Examples of unrelated dermatologic complaints seen in our PLC visits include rosacea and hand dermatitis. We encourage patients to schedule an appointment with their PLC clinician if they discover a suspicious lesion or have another dermatologic concern, which is why problem-focused visits were never classified as additional screening and were designated as a separate category. If patients acquired a new diagnosis or recurrence over the 2-year period, their standard follow-up schedule changed accordingly.

Tests of significance were 2-tailed with an \( \alpha = .05 \) using SAS statistical software (SAS Institute Inc). Comparisons of distributions and proportions were performed with \( \chi^2 \) analyses.

Results

Among 609 patients identified, there were 1756 visits. Of these, 25 patients associated with 26 patient visits did not have any melanoma diagnoses or risks for melanoma, as listed in the Methods section, and were excluded from the analysis, leaving \( 584 \) patients and 1730 visits. The mean (SD) age at the sentinel visit was 48 (16) years (range, 3-87 years); 235 (40.2\%) of the patients were male and 349 (59.8\%) were female. Demographics by standard follow-up schedule are shown in Table 1. The most common reason for patients to be followed in the PLC was invasive melanomas (55.7\%), while the least common reason was for Spitz nevi (0.7\%). The remaining percentages are shown in Table 2.

The CONSORT diagram (Figure) shows the division of visits by 4 standard follow-up schedules. The standard follow-up schedule 1, for invasive melanoma, consisted of visits every 3 months for 2 years, biannual visits for the following 2 years, then annual visits thereafter. Standard follow-up schedule 2, for MIS and severely DN, consisted of biannual visits for up to 3 years, then annual visits thereafter. Standard follow-up schedule 3, for moderately DN and atypical nevus syndrome, consisted of biannual visits for 1 year, then annual visits thereafter. Standard follow-up schedule 4, for Spitz nevus, mildly DN, solely family history of melanoma, and other risk factors, consisted of annual visits. The 4 standard follow-up categories are further subdivided into standard, additional screening, and problem-focused visits.

Of the total 1730 visits, 1400 (80.9\%) were classified as standard, 257 (14.9\%) were classified as additional screening, and 73 (4.2\%) were classified as problem-focused visits. Of the 73 problem-focused visits, 38 (52.1\%) included examination of a new or changing lesion, and the remainder were solely for an unrelated dermatologic complaint. Thirty percent of patients had at least 1 additional screening visit over the 2-year period. The breakdown of additional visits by diagnosis is listed in Table 2, with mild DN and moderate DN as well as severely DN and MIS combined. The more severe diagnoses, including MIS and invasive melanoma, severely dysplastic nevi, and atypical nevus syndrome, comprised a total of 74.9\% of all visits and utilized 79.4\% of the additional screening visits. The less severe diagnoses, including mildly and moderately dysplastic nevi, family history of melanoma only, or multiple nevi, comprised the remaining 25.1\% of all visits and utilized 20.6\% of the additional screening visits. Patients with Spitz nevi utilized the single highest percentage of additional screening visits (25.0\%) while those with other risk factors utilized the least (8.3\%). The distribution of diagnoses for standard vs additional screening visits differed significantly (\( P = .04 \)) with family history of melanoma only and other risk factors comprising a larger percentage of standard visits than percentage of additional screening visits, and all other diagnoses being better represented among additional screening visits.

The sex distribution and personal history of more than 1 melanoma among patients with 1 or more additional screening visits was not statistically significantly different than those without additional screening visits. Those with a family history of melanoma trended significance (\( P = .06 \)) of patients with additional screening visits, 50 of 175 (28.6\%) reported a
family history of melanoma vs 157 of 409 (38.4%) for those without additional screening visits. Of note, 40 patients who had more than 1 additional screening visit and 72 with no additional screening visits did not answer the question regarding family history of melanoma.

Biopsy results of patients at both standard and additional screening visits were investigated. For the 1400 standard visits, 233 (16.6%) included a biopsy, of which 18 (7.7%) resulted in either MIS or invasive melanoma. For the 257 additional screening visits, 40 (15.6%) included a biopsy, of which 2 (5.0%) resulted in either MIS or invasive melanoma. For the 73 problem-focused visits, 25 (34.2%) included a biopsy (21 of which were at a visit for new or changing lesion, with the remaining 4 at visits for unrelated dermatologic complaints), and none were MIS or invasive melanoma. Neither the rate of biopsy nor the rate of malignant biopsy was statistically significantly different between standard visits and additional screening visits ($P < .67$ and $P < .49$, respectively). There was a statistically significantly higher rate of biopsy in problem-focused visits ($P < .001$), but no difference in rate of malignant findings ($P < .45$).

### Discussion

This retrospective study indicates that a substantial proportion of visits to the PLC (about 1 in 7) were more frequent than is recommended. Put in a different way, 30% of patients had at least 1 additional screening visit during the 2-year period examined. Although severe diagnoses represented almost 80% of additional screening visits, the scheduling of additional visits was common to all patients with pigmented lesions. The rate of biopsy and malignant biopsy results did not differ significantly between additional screening visits and standard visits, although statistical power in these subgroups was limited.

Patients with dysplastic nevi or melanoma had a higher percentage of additional screening visits, but interestingly, the highest percentage of additional screening visits was among patients with Spitz nevi and atypical nevus syndrome. The increase in atypical nevus syndrome may be explained by patient discomfort with self-monitoring of multiple atypical nevi (even with digital photographs) with only 1 or 2 dermatology visits per year. Those with Spitz nevi (all of which were histologically atypical) may be uncomfortable with the uncertainty of the medical literature regarding their prognosis and desire more than the recommended annual visit.

To our knowledge, this study is the first to examine the overutilization of a PLC by examining additional screening visits outside of the recommended follow-up intervals for pigmented lesions. Previous research has revealed high levels of distress in women diagnosed as having melanoma, which may contribute to the desire for more frequent surveillance. Combined with the increasing incidence of melanoma, our findings are highly suggestive of a high and increasing demand for PLC visits. This growing demand exists in the setting of relatively static supply, limited by the number of specialized clinicians and by the obligation to equitably distribute resources. Our data indicate that patients may desire more frequent follow-up than the PLC can reasonably and fairly provide. We therefore suggest the existence of a supply-and-demand discrepancy within the PLC.

There are potential limitations in this retrospective medical chart review, including the fact that the accuracy of the information gathered is dependent on the accuracy of electronic medical records, which cannot be guaranteed. Second, although the overall sample size is robust, the power is limited when examining subgroups owing to small numbers. This
research would benefit from a longer period of medical chart review expanded to multiple centers with PLCs. Third, because we did not gather data on patients’ visits to community dermatologists between standard visits, it is possible that our results underestimated the frequency of additional screening visits. However, if this were so, the number of additional screening visits would only be magnified. Visits that were less frequent than recommended on the standard schedule were not distinguished. Finally, although Emory University may be roughly representative of other academic dermatology departments, the results of this single-center study may not apply to other PLCs with different practices. Because there is no universal, standard, follow-up schedule for patients with melanoma and pigmented lesions, we used one developed by Emory University based on the best evidence available, which may differ from schedules that other PLCs use. Although our clinicians strive to follow standardized recommendations for all patients, it is possible that some of the additional visits for total-body skin examinations were clinician-initiated owing to higher level of concern than normal, but this is difficult to determine from a retrospective medical chart review. Factors that may have contributed to additional visits that we could not control for include patient reliability to monitor moles at home, immunosuppression, UV exposure, and patients’ anxiety levels. These issues need to be discussed in a consensus format, if not future research, in order to standardize follow-up recommendations for patients with a history of dysplastic nevi; labeling visits as additional screening would require such standard recommendations.

One way to approach the unanswered demand for additional screening visits is to determine whether the PLC should be reserved solely for patients with melanomas. While limiting PLC visits to patients with more severe diagnoses would save 25.1% of all visits, it is often difficult to refuse patients with melanoma who want to bring their family members on the same day, especially when they drive long distances to take advantage of the technology and expertise afforded by PLCs. Similarly, our patients with mild-to-moderate dysplastic nevi may also have atypical nevi that are best monitored by digital photography, which then necessitates PLC visits.

This would apply to visits not related to pigmented lesions as well. For instance, 25% of the patients (associated with 1171

focused visits, and new patients while at the same time meeting the needs of patients who request additional screening visits. For those who are willing to pay for the additional screening, the fee-for-additional-service clinic would provide a desired service while allowing the PLC a means to implement additional resources to handle such additional demand. These data indicate that this model could potentially benefit patients with varying diagnoses and may be especially helpful to those whose level of worry is out of proportion to their diagnosis. However, our research does not specifically address whether patients are willing to pay for additional screening visits, and further market research would be required to fully answer this question. It is important to note that the fee would be charged only for an additional screening visit that includes a total-body skin examination, never for a visit for a new or changing lesion, because those visits are encouraged under the standard care recommendations.

A similar clinic structure has been successfully implemented in primary care, in which clinicians split their time between standard and concierge clinics, increasing overall clinic income, and providing a desired service for those willing to pay. Of note, current insurance regulations do not allow for both concierge and insurance payment for the same service. However, the goal of this report is to highlight the supply-and-demand discrepancy so as to encourage clinicians to start thinking of ways to deal with the issue.

When considering such a clinic model, the utility of standard vs additional screening visits should be considered. We attempted to discern their utility by comparing the rate of biopsy and rate of malignant findings at the respective visit types. It is notable that, although rate of biopsy was slightly higher for standard visits, it was not statistically significantly different from additional screening visits (7.7% vs 5.0%). Similarly, the proportion of visits resulting in malignant findings was slightly higher for standard visits compared with additional screening visits but was not statistically significantly different (1.2% vs 0.8%). However, the actual number of malignant biopsy findings in both cases was very small compared with the number of visits (2 malignant findings at additional screening visits and 18 malignant findings at standard visits), and statistical analyses may be limited. Only 2 malignant findings were detected at additional screening visits, and it is difficult to determine from these limited data if the earlier clinic visit had any impact on the clinical course for those patients. A larger sample size and longer time period would be needed to accurately infer the comparative utility of standard vs additional screening visits in this population. Of note, problem-focused visits had the highest rate of biopsy, likely owing to patient concern and request for biopsy, but with no malignant findings.

As another method to address the supply-and-demand discrepancy, innovative pigmented lesion surveillance methods, such as teledermatology, could be used. Teledermatology is limited in that it does not allow palpation of the lesion, comparison of the lesion in question to overall mole pattern, or appreciation of subtle features, and there have been conflicting results in accuracy for detecting malignant pigmented lesions via teledermatology. However, although teledermatology cannot fully replace an in-person examina-
tion by a pigmented lesion expert, it may become important to explore teledermatology as an adjunct to standard clinical examinations to help meet the growing demand for PLCs and provide another avenue for accessing a dermatologist.

Conclusions

Our study found that 14.9% of patient visits to our PLC were more frequent than the recommended follow-up schedule. This is common to all patients who visit the clinic, regardless of sex, family history, personal history of more than 1 melanoma, and severity of diagnosis. Increasingly more patients are being diagnosed as having melanoma every day, and the current care model of allowing patients to schedule extra visits may not be sustainable in the long-term. Possible solutions include the creation of diagnosis-specific, fee-for-additional-service, and teledermatology clinics. This would increase appointment availability in the standard pigmented lesion clinic and meet patients’ needs and desires more efficiently. However, until current insurance models allow for such hybrid approaches for melanoma care, clinicians should consider how to combat the supply-and-demand discrepancy in PLCs.