

# Documentation of Conformance to Preferred Practice Patterns in Caring for Patients With Dry Eye

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**Objective:** To evaluate documentation of physician evaluations of patients with dry eye for the presence of key elements as defined in the American Academy of Ophthalmology Summary Benchmarks for Preferred Practice Patterns.

**Methods:** One hundred thirty-one medical records of patients seen at the Duke Eye Center from January 1998 to July 2008 were reviewed relative to both the dry eye preferred practice patterns benchmarks for 1998 (all patients) and 2003 (for those seen between 2004 and 2008). Overall total score and subsection scores were calculated for all patients, as well as by specialty provider types and by type of medical record (electronic vs paper).

**Results:** Of all records reviewed, 84.8% were for women and the mean (SD) age of all patients was 60.3 (20.8) years. On average, 66.4% of the initial history key elements, 77.3% of the initial physical examination key elements,

40.0% of care management key elements, and 67.9% of patient education key elements were documented. The physical examination scores were highest in the "other" subspecialty ophthalmologist group compared with the comprehensive ophthalmologist group ( $P = .03$ ) and cornea specialists ( $P = .02$ ). The physical examination scores were 87% in the electronic medical record and 75% in the standard paper medical record ( $P < .001$ ) groups.

**Conclusions:** In an academic practice, the process of care delivery for dry eye does conform to the American Academy of Ophthalmology Preferred Practice Patterns in some areas; however, there is room for improvement especially in the areas of patient education and care management. Additional data are needed from other practice settings to further evaluate the quality of dry eye care.

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**D**RY EYE IS ONE OF THE MOST frequent reasons for seeking eye care, affecting millions of Americans.<sup>1,2</sup>

The prevalence of dry eye has been studied in a variety of populations and has been reported to be between 7% and 33%, being more common in older adults and women.<sup>2-7</sup> Several comorbid conditions and habits have been variably associated with dry eye, including history of arthritis, thyroid disease, gout, diabetes mellitus, smoking, and caffeine use.<sup>4,5</sup> Medications such as antihistamines and diuretics have also been reported to increase the incidence of dry eye.<sup>4</sup>

Dry eye has a significant impact on quality of life.<sup>8</sup> Schiffman et al<sup>9</sup> showed that patients with dry eye report reduced quality of life, having a utility score similar to patients with moderate to severe angina. Given the high prevalence and impact on vision-related quality of life, the humanistic burden related to dry eye can be great. In addition, there may be significant economic costs associated with dry eye disease and its care. Patients with dry eye incur direct costs of seeing their ophthalmologists and treatment, as well as the indirect costs of missed

work days and decreased functioning.<sup>10</sup> Currently, there are limited studies of the economic impact of dry eye; however, to date, pharmacologic and surgical therapies have been identified as the most costly.<sup>10</sup> With the projection of greater life expectancy, as well as shifting demographics, it is reasonable to predict an increase in the number of patients with dry eye who will need or seek eye care. Given these considerations, it is important to examine the current process of care as it relates to dry eye and to determine if appropriate care is being provided to patients with dry eye disease. Quality of care has been previously reported for glaucoma, diabetic retinopathy, esotropia, and cataract.<sup>11-17</sup> To our knowledge, there have been no prior studies published in the literature examining how well ophthalmologists conform to guidelines for the care of patients with dry eye. The purpose of this study was to evaluate documentation of dry eye evaluations, with respect to history, physical examination, care management, and patient education, for the presence of key elements as defined in the American Academy of Ophthalmology (AAO) Summary Benchmarks for Preferred Practice Patterns (PPP).

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**Table 1. Metric Tool for Dry Eye Preferred Practice Patterns 1998 Benchmark**

Practice Element	Point Score
Initial examination history	
Ocular symptoms and signs	20
Duration of symptoms	20
Topical medications used and their effect on symptoms	20
Ocular history, including	
Contact lens wear, schedule, and care	5
Eyelid surgery	5
Bell palsy	5
Chronic ocular surface inflammation	5
Systemic history, including	
Dermatological diseases	4
Atopy	4
Menopause	4
Systemic inflammatory disease	4
Systemic medications	4
Initial physical examination	
Visual acuity	33.3
External examination	
Skin	8.33
Eyelids	8.33
Adnexae	8.33
Cranial nerve function	8.33
Slitlamp biomicroscopy	
Tear film	4.76
Eyelash	4.76
Anterior and posterior eyelid margin	4.76
Puncta	4.76
Inferior fornix and tarsal conjunctiva	4.76
Bulbar conjunctiva	4.76
Cornea	4.76
Care management	
Elimination of exacerbating exogenous factors (medication, environmental factors)	20
Artificial tears and ointments	20
Humidification of the environment	20
Spectacle side shields, moisture inserts, or moisture chambers	20
Surgical therapies are used for patients with inadequate medical treatment	20
Education	
Counsel patients about the chronic nature of dry eye and its natural history	25
Provide specific instructions for therapeutic regimens	25
Reassess periodically the patient's compliance and understanding of the disease, risks for associated structural changes and realistic expectation for effective management, and reinforce education	25
Refer patients with manifestation of a systemic disease to an appropriate medical specialist	25

## METHODS

The study protocol was approved by the institutional review board. A retrospective review of 131 medical records from a variety of physician practices at the Duke University Eye Center, regardless of subspecialty, was performed. A random sample of medical records was selected for review among patients diagnosed with dry eye between January 1, 1998, and July 31, 2008. The medical records were reviewed for documentation of key elements of the initial evaluation history, physical examination, care management, and patient education, as defined in the AAO Summary Benchmarks for dry eye.

## RESULTS

The AAO PPP for dry eye were revised in 1998<sup>18</sup> and 2003.<sup>19</sup> Our primary analysis was to compare all medical records with the 1998 dry eye PPP benchmarks (**Table 1**). A secondary analysis was done using the 2003 dry eye PPP to examine those evaluations done from 2004 to 2008, because the PPP benchmarks were revised in 2003. As a separate analysis, we calculated scores by physician subspecialty: cornea specialists, comprehensive ophthalmologists, and other specialists (glaucoma, oculoplastic, retina, and pediatric ophthalmology). Finally, we also calculated scores and compared them between electronic medical records (EMRs) and standard paper medical records to see if there was a difference in overall and subset scores. The EMRs in this study were entirely completed electronically and consisted of standard template fields for routine clinical examination. The user has the option to complete or leave blank any portion of the standard template, in addition to adding other information not in the template.

All key elements included for review in the present study were level A (level A being the most important to the care process, as defined by the AAO). The rating evidence strength is divided into 3 levels: (1) level 1 included evidence obtained from a randomized controlled trial or meta-analysis of randomized controlled trials; (2) level 2 included evidence obtained from nonrandomized trials or cohort or case-control studies; and (3) level 3 included evidence obtained from descriptive studies, cases reports, and/or reports of expert committees/organization. We included all key elements of level A1 to A3 recommendations. In comparing the level A recommendations in the dry eye Summary Benchmarks for 1998 and 2003, the following differences were noted in the 2003 dry eye PPP: (1) in the initial history section, corneal history and punctal surgery were added as subpoints to ocular history, (2) documentation of smoking and trauma were added as subpoints to systemic history, and (3) in the care management and education sections, computer work site intervention and educating patients with preexisting dry eye that laser in situ keratomileusis or photorefractive keratectomy may worsen their dry eye condition were added.

A total of 100 points was ascribed to each of the 4 sections (400 points overall: 100 points for initial history, 100 points for physical examination, 100 points for care management, and 100 points for patient education). Among each of the 4 subsections, the 100 points were divided equally for each summary benchmark bullet point in that section (ie, the initial history section for the 1998 dry eye PPP had 5 summary benchmark bullet points, yielding 20 points possible per bullet point for that section). Finally, an overall score for each medical record was calculated by averaging the 4 individual subsection scores. All data were entered into an Excel spreadsheet (Microsoft, Redmond, Washington). An analysis of variance and *t* test were done to compare scores between physicians by subspecialty type. We also used 2-sample *t* tests to compare the scores between EMRs and standard paper medical records. A *P* value less than .05 was considered statistically significant.

Of the 131 medical records reviewed, 63.4% were for patients initially diagnosed between 1998 and 2003. From all medical records reviewed, 28.2% were for patients diagnosed initially by a cornea specialist; 21.4% were diagnosed by comprehensive ophthalmologists; and 50.4%, by other specialists. The sex distribution was predominantly female. Of the medical records with a diagnosis made after 2004, 21.3% were EMRs, whereas only 3.6% of medical records with a diagnosis made between 1998 and 2003 were EMRs.

**Table 2. Initial History Scores**

Initial History	Documentation, %	
	1998-2008 (n=131)	2003-2008 (n=47)
Symptoms and signs	99.2	100.0
Duration of symptoms	81.7	91.5
Topical medication	74.1	72.3
Ocular history		
Contact lens wear	19.9	17.0
Corneal history	<sup>a</sup>	28.1
Eyelid surgery	43.5	27.7
Punctal surgery	<sup>a</sup>	31.9
Bell palsy	6.1	6.4
Chronic ocular surface inflammation	7.6	6.4
Systemic history		
Smoking	<sup>a</sup>	61.7
Dermatological disease	48.9	46.8
Atopy	41.2	31.9
Menopause	34.4	27.7
Systemic inflammatory disease	71.8	63.8
Systemic medication	84.0	76.6
Trauma	<sup>a</sup>	27.7
<b>Mean total score</b>	<b>66.4</b>	<b>70.6</b>

<sup>a</sup>Not included in 1998 American Academy of Ophthalmology Preferred Practice Patterns level A recommendation.

**Table 2** shows the scores for documentation of key elements in the initial history section. Conformance was best in ascertaining patient symptoms and signs and their duration. For ocular history, contact lens wear and schedule was recorded in only 19.9% of all medical records, and only 6.1% and 7.6% of medical records recorded the presence or absence of Bell palsy and chronic ocular inflammation history, respectively. History of eyelid surgery was recorded more often in the medical records with the diagnosis between 1998 and 2003 than in those with a diagnosis after 2004. For systemic history, there was a relatively low percentage of documentation of menopause and atopy, especially in medical records with a diagnosis after 2004.

**Table 3** shows the percentage of documentation of key elements in the physical examination section. All of the medical records documented visual acuity examination. Documentation of cranial nerve V and VII function was recorded in only 6.1% of medical records. In the slitlamp examination section, the eyelash and puncta examinations were found in a relatively lower percentage of medical records compared with documentation of tear film, cornea, and bulbar conjunctiva examinations. Medical records with an initial diagnosis of dry eye after 2004 showed higher conformance in each key element of external and slitlamp examination.

**Table 4** shows the percentage of documentation of key elements in care management. Of all patients, 90.1% received aqueous tear treatment. However, only 4.6% of all patients received ocular environment intervention. For patients with eyelid abnormalities, most medical records had documentation of eyelid surgery recommendations. **Table 5** shows the percentage of documentation of key elements in the patient education section. For all medical records reviewed, 89.3% had documentation that specific therapeutic regimen instructions were given to the patient and 74.8% documented

**Table 3. Physical Examination Scores**

Physical Examination	Documentation, %	
	1998-2008 (n=131)	2003-2008 (n=47)
Visual acuity	100.0	100.0
External examination		
Skin	42.0	46.8
Eyelid	84.7	97.9
Adnexa	65.7	78.7
CN V and VII	6.1	6.4
CN III, IV, and VI	48.9	61.7
Slitlamp examination		
Tear film	89.3	93.6
Eyelashes	33.6	61.7
Anterior and posterior eyelid margin	78.6	95.7
Puncta	60.3	87.2
Inferior fornix and tarsal conjunctiva	75.6	95.7
Bulbar conjunctiva	94.7	100.0
Cornea	98.5	100.0
<b>Mean total score</b>	<b>77.3</b>	<b>84.8</b>

Abbreviation: CN, cranial nerve.

**Table 4. Care Management Scores: Patients With Aqueous Tear Deficiency**

Care Management	Documentation, %	
	1998-2008 (n=131)	2003-2008 (n=47)
Elimination of exacerbating medications	13.6	28.5
Ocular environmental interventions	4.6	0.0
Humidification of ambient air	13.0	17.0
Computer work site intervention	<sup>a</sup>	2.1
Spectacle side shields, moisture inserts, and moisture chamber	8.4	<sup>b</sup>
Aqueous tear enhancement	90.1	89.4
Correction of eyelid abnormality <sup>c</sup>	90.0	100.0
Punctal occlusion or tarsorrhaphy <sup>c</sup>	69.5	66.7
<b>Mean total score</b>	<b>40.0</b>	<b>38.5</b>

<sup>a</sup>Not included in 1998 American Academy of Ophthalmology Preferred Practice Patterns level A recommendations.

<sup>b</sup>Not included in 2003 American Academy of Ophthalmology Preferred Practice Patterns.

<sup>c</sup>Surgical intervention if medical therapy is inadequate or inappropriate.

reassessment of patient compliance. Only 47.3% of all medical records had documented educating patients about the chronic nature of dry eye.

**Figure 1** shows the mean total scores among different specialists. The patient history scores were similar between the 3 groups. The physical examination scores were highest in the "other specialists" group compared with the comprehensive ophthalmologist group ( $P = .03$ ) and cornea specialists ( $P = .02$ ). Cornea specialists had slightly higher scores in care management and patient education compared with the other specialists and comprehensive groups, though not statistically significant ( $P = .22$  and  $.57$ , respectively).

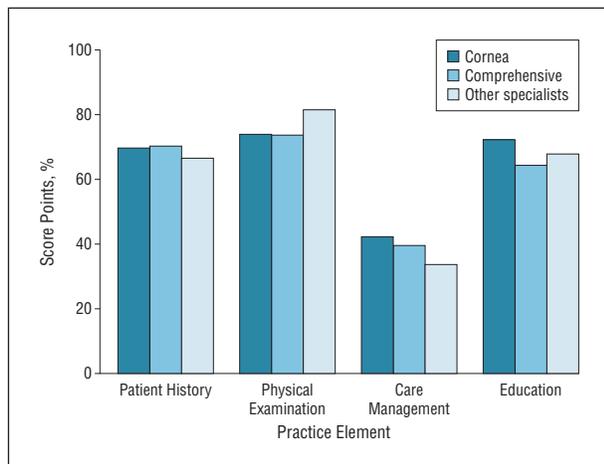
**Figure 2** shows the mean total scores for EMRs and standard paper medical records. The EMRs had significantly higher physical examination scores compared with the standard paper medical records ( $P < .001$ ). The dif-

**Table 5. Patient Education Scores**

Patient Education	Documentation, %	
	1998-2008 (n=131)	2003-2008 (n=47)
Counsel patients about chronic nature and natural history of dry eye	47.3	53.2
Provide specific instructions for therapeutic regimens	89.3	89.4
Reassess patient's compliance and reinforce education	74.8	74.5
Refer patients with manifestation of a systemic disease to medical specialist	48.0	33.3
Caution patients with dry eye that LASIK or PRK may worsen dry eye	<sup>a</sup>	33.3
<b>Mean total score</b>	67.9	66.6

Abbreviations: LASIK, laser in situ keratomileusis; PRK, photorefractive keratectomy.

<sup>a</sup>Not included in 1998 American Academy of Ophthalmology Preferred Practice Patterns level A recommendation.



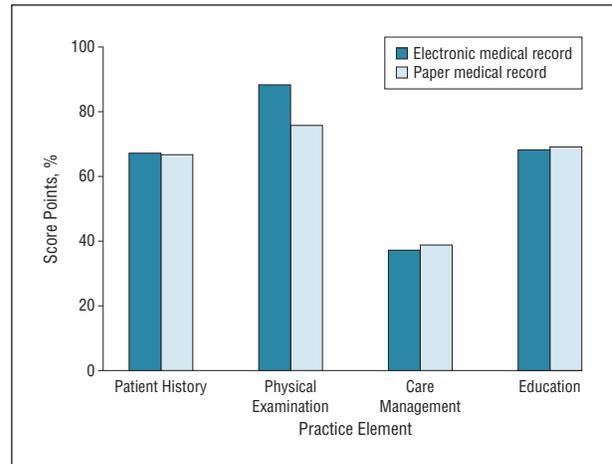
**Figure 1.** Comparison of mean scores between different specialists.

ference in mean scores of patient history, care management, and education between the 2 groups was not significant ( $P = .90, .78, \text{ and } .89$ , respectively).

**COMMENT**

Optimizing evaluation and management of patients with dry eye is important because of our growing older population and the high prevalence of potential burden of the disease.<sup>1-3</sup> To determine if we can effectively reduce the burden and impact of dry eye disease, we must first determine how it is being cared for in practice. To our knowledge, this is the first study to evaluate the conformance of dry eye care to the AAO PPP. The results demonstrated variable performances across the PPP elements, many with adequate adherence for some key elements in each section of the PPP, but others in need of significant improvement.

We separated all of the medical records into 2 groups by the dates of the initial diagnosis made because there are some differences between 1998 and 2003 PPP level



**Figure 2.** Comparison of mean scores between electronic medical record and paper medical record.

A recommendations. It also helped us to evaluate the treatment pattern difference between the 2 groups. However, both groups showed relatively poor conformance in the patient history, care management, and education sections. The conformance in the physical examination section was better in medical records with an initial diagnosis after 2004. Part of this improvement may be due to the use of EMR after 2004. Paper medical records pose a problem when handwriting is not legible (all notes in this study were deciphered by the consulting physician when necessary). The EMR used in our study has a structured, coded format, especially in the physical examination section. Several systemic reviews have pointed out that the use of EMR increases conformance to process care guidelines.<sup>20,21</sup> Our study results also support the benefit of EMR, but the benefit here was limited to the physical examination section. Electronic medical record vendors should be encouraged to address the parts of patient history, care management, and education.

Surprisingly, the cornea specialists did not show better conformance than other physician subtypes because they received special training in the diagnosis and management of dry eye syndrome. However, a study conducted by Khadem et al<sup>22</sup> surveyed retinal specialists and general ophthalmologists to evaluate the practice pattern of diabetic retinopathy care and also found that general ophthalmologists were more likely to follow guidelines for certain care processes than retinal specialists. This finding may be supported by the idea that subspecialists are more comfortable in their ability to evaluate and treat patients with diagnoses that they are most familiar with, thus potentially becoming more lax in their documentation.

Some key processes in care management, such as elimination of systemic medication, environment intervention, computer work site intervention, and humidification of ambient air, appeared to be largely overlooked by eye care providers. Many physicians appear to focus on medication therapy alone, perhaps having firmer convictions about the effectiveness of medication therapy or rather feeling that education about environmental or lifestyle modification therapy for dry eye (or its documen-

tation) would be time-consuming. Others have noted that prescribing eye drops is the easiest and most secure method of satisfying patients.<sup>23</sup>

There are some limitations of our study. First, our study only included physicians in 1 medical center. Our findings may not be generalizable to other geographic areas or practice settings. Second, our assessment of conformance to the PPP relied on medical record review. It is possible that items were documented and not done or done but simply not documented. Studies have shown that there are differences between information documented in the medical record and that which is actually performed at the time of clinical examination.<sup>11</sup> Certain practice elements, such as those in the care management and patient education section, may be more difficult to ascertain because the medical records did not have a structured format for these elements. Third, our study was intended to review adherence to practice patterns, not outcome. Future studies will be needed to examine the correlation between conformance to PPP and clinical outcome. Fourth, we did not address the issue of misdiagnosis and resulting inappropriate treatment. Because there is no "gold standard" for dry eye syndrome diagnosis<sup>24,25</sup> and correlation between symptoms and signs is poor,<sup>26</sup> there may be overlap between those with dry eye and those without dry eye. In the present study, however, we did assess only cases that the documenting physicians diagnosed as dry eye syndrome and, as such, the present study does reflect care provided to such patients.

In looking forward, we note that newer guidelines, such as the International Task Force guideline published in 2006,<sup>27</sup> the new AAO dry eye PPP published in 2008,<sup>28</sup> and the published reports from the Management and Therapy Subcommittee of the International Dry Eye Workshop,<sup>29</sup> recommend treatment based on the level of disease severity. Given that the 1998 and 2003 PPP did not stratify by disease severity, it is possible that some patients would not be eligible for certain treatment recommendations. For example, in some guidelines, spectacle side shields, moisture chambers, and punctal plugs are only recommended for patients with moderate to severe dry eye syndrome.<sup>27,28</sup> The International Task Force guideline also notes that punctal plugs should be used only after inflammation (if present) has been controlled.<sup>27</sup> This stratification could impact conformance to the PPP in certain areas. However, in this study, we wanted to use the guidelines in place at the time care was rendered.

In conclusion, we found that ophthalmologists' adherence to some key elements in the dry eye PPP was highly variable, especially in areas of care management and education. Cornea specialists did not show better conformance than comprehensive or other subspecialty ophthalmologists. The use of EMR may benefit with better documentation within the medical record, but the benefit in our study was limited to documentation of the physical examination process. Additional data are needed from other practice settings and other geographic areas to more fully assess the physician behavior relative to practice patterns.

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