



Queensland University of Technology
Brisbane Australia

This is the author's version of a work that was submitted/accepted for publication in the following source:

[Collins, Michael J.](#) & [Carney, Leo G.](#) (1986) Patient compliance and its influence on contact lens wearing problems. *American Journal of Optometry and Physiological Optics*, 63(12), pp. 952-956.

This file was downloaded from: <http://eprints.qut.edu.au/3192/>

© Copyright 1986 American Academy of Optometry

Reproduced in accordance with the copyright policy of the publisher.

Notice: *Changes introduced as a result of publishing processes such as copy-editing and formatting may not be reflected in this document. For a definitive version of this work, please refer to the published source:*

Patient Compliance and Its Influence on Contact Lens Wearing Problems

M. J. COLLINS*

L. G. CARNEY†

Department of Optometry, Queensland Institute of Technology and University of Melbourne, Australia

ABSTRACT

One hundred consecutively presenting patients, fifty from each of two contact lens clinics, were questioned about the procedures encountered in care and maintenance of their contact lenses and asked to demonstrate their use of those procedures. Their clinic records were then analyzed for the occurrence of signs and symptoms that were related potentially to noncompliance with instructions and procedures, and that could not be otherwise explained. Only 26% of patients were fully compliant. Noncompliance with instructions was related strongly to the occurrence of signs and symptoms indicative of potential wearing problems. Improvements in the level of patient compliance with instructions is likely to bring about increased patient success with contact lens wearing.

Key Words: extended wear, contact lenses, lens care regimens, noncompliance

Compliance has been defined as "the extent to which a patient's behavior coincides with the clinical prescription."¹ The problem of patient compliance is a major one for any health profession. Ley collated data from 68 surveys of patient compliance with medical advice and found that an average of 44% of patients did not follow medical advice, with a range of noncompliance across studies of 8 to 92%.²

A number of factors have been shown to reduce compliance. These include the complexity, duration, and cost of the therapeutic regime; the patient's understanding of written information; and the patient-clinician relation. Factors that have been shown to have no influence on the level of compliance include the patient's age,

sex, race, education, occupation, socioeconomic level, and the perceived threat of the disease.³

An underlying assumption in most analyses of the reasons for inadequate contact lens performance is that the patient has followed instructions on care and maintenance procedures rigorously. The evidence from other health professions is that such an assumption may be unwarranted.¹⁻⁶ In the case of contact lens wearing, failure to carry out complete and timely lens maintenance procedures could interfere with the otherwise successful wearing of contact lenses. Extended wearing of contact lenses may be particularly vulnerable to this problem.

This study investigates two aspects of contact lens wearers' compliance: the level of compliance with specific contact lens care and maintenance instructions, and the relation of noncompliance to clinically recognizable lens wearing problems.

METHODS

Subjects for the study were patients of two contact lens teaching clinics, one at the University of Melbourne and the other at the Queensland Institute of Technology. Fifty consecutively presenting patients from each of these clinics who had sought routine aftercare examinations, and had undergone at least two previous aftercare visits, were surveyed.

The subjects in this survey had been wearing contact lenses for an average of 2.64 years (range 0.25 to 8 years). Most wore lenses 7 days per week and 8 to 14 h per day. Only subjects wearing daily wear lenses were included, 82% wearing soft lenses and 18% wearing hard lenses. Of the soft lens wearers, 56% used thermal disinfection and 44% used chemical disinfection (none were using hydrogen peroxide-based systems).

Subjects were interviewed after they had completed their current office visit. They were asked a standardized series of questions relating to contact lens wearing behavior and to their lens care and maintenance procedures. To assess

Received January 6, 1986.

* Optometrist, Member of Faculty.

† Optometrist, Ph.D., Member of Faculty, F.A.A.O.

care and handling of their contact lenses each subject was asked to demonstrate for the investigator their normal care and maintenance procedures. Subjects were instructed to answer questions and perform procedures as they normally would, rather than as they believe they should be performed. From these interviews and demonstrations, 14 aspects of noncompliance with appropriate lens maintenance procedures were identified, and the incidence of each noncompliance aspect established (Table 1).

After the survey, the clinic record of each subject was analyzed by the investigator (MJC or LGC) to identify the occurrence of lens surface deposits, punctate corneal epithelial staining, and subjective symptoms. These signs and symptoms were recorded as potentially due to patient noncompliance only when an investigation of the clinic record failed to disclose other possible causes, such as inadequate lens fit, overwear of lenses, tear film or corneal abnormalities, or trauma.

RESULTS

Only 26% of subjects were found to be compliant in all aspects of their lens care and maintenance system. Of the 74% noncompliant subjects, the majority were unaware that their pro-

cedures were in some way inadequate. Those aspects of lens care and maintenance displaying the worst levels of compliance were: irregular use of daily cleaner (20%); inadequate technique with daily cleaner (29%); inadequate rinsing technique (20%); irregular replacement of disinfection solution (18%); irregular cleaning of contact lens case (28%); and inadequate hand hygiene (16%). Table 1 gives the percentage of subjects who were noncompliant in each of the 14 aspects of lens care and maintenance, identified both by questioning and observation of techniques.

At one or more aftercare consultations the following percentages of otherwise unaccountable signs and symptoms were noted: 32% of subjects had shown corneal staining, 43% had significant lens surface deposits, and 24% had at least one occurrence of subjective symptoms.

The specific aspects on noncompliance could be compared with the incidence of specific signs and symptoms potentially due to noncompliance. However, subjects often exhibited multiple noncompliance aspects. To avoid the confounding influence of additional noncompliant behavior, subjects would be included in any specific noncompliant group when this was their only aspect of noncompliance. Because this unduly limits the statistical analysis, an alternative approach of compiling indices of compliance and lens wearing problems was used.

The compliance index for each subject was calculated by totalling the number of aspects of noncompliance, as described in Table 1. For example, a subject who failed to regularly use the daily cleaner, regularly change the disinfection solution, and regularly clean the contact lens case would have a compliance index of 3. A subject who was compliant in all aspects would have a compliance index of 0. The distribution of compliance indices in this population is given in Fig. 1. Length of lens wearing experience, type of lens worn (hard vs. soft), sex of subject, type of disinfection (chemical vs. thermal); and clinic from which the subject population was drawn were shown to have no influence on the level of compliance (Table 2).

This compliance index was compared with the incidence of corneal staining, lens surface deposits, and subjective symptoms. Comparisons were drawn between those showing good compliance (having none or one aspect of noncompliance) and those with poor compliance (more than one noncompliance aspect). The results are shown in Table 3, together with statistical analyses of significance of the differences (χ^2 analysis). The increased incidence of these signs and symptoms with poor compliance is illustrated in Fig. 2.

A signs and symptoms index describing the

TABLE 1. Incidence of specific aspects of noncompliance among a population of 100 contact lens wearers.

	Patients (%)
Irregular use of daily cleaner	20
Inadequate technique with daily cleaner	29
Irregular use of rinsing solution	5
Inadequate rinsing technique	20
Re-using rinsing solution	2
Irregular replacement of disinfection solution	18
Irregular use of thermal disinfection	1
Irregular use of periodic cleaner	3
Leaving lenses too long in periodic cleaner	3
Using daily cleaner after chemical disinfection	9
Using daily cleaner after thermal disinfection	10
Using daily cleaner after periodic cleaner	10
Irregular cleaning of contact lens case	28
Inadequate hand hygiene	16
One or more aspects of noncompliance	74

NUMBER OF ASPECTS OF NON-COMPLIANCE PER PATIENT



FIG. 1. Distribution of compliance index results in the total population of 100 contact lens wearers.

TABLE 2. Factors shown to have no influence on the level of patient compliance.

Factor	Compliance Index		χ^2	Significance Level
	(0 or 1) Good	(>1) Poor		
Type of lens worn				
Hard	3	41	1.38	Not significant
Soft	19	105		
Sex of subject				
Male	6	64	2.62	Not significant
Female	18	78		
Type of disinfection				
Thermal	7	49	0.01	Not significant
Chemical	14	89		
Clinic population				
Queensland Institute of Technology	10	75	0.07	Not significant
University of Melbourne	12	72		
Length of lens wear vs. compliance index Correlation coefficient = -0.03				Not significant

nature of lens-wearing difficulties was determined in a similar fashion to the compliance index by considering the total recorded incidence of corneal staining, lens surface deposits, and subjective symptoms. For example, a subject who showed corneal staining at one aftercare consultation and significant lens surface deposits at two consultations (the causes of which were not otherwise apparent) would have a signs and symptoms index of 3.

There is a significant relation between the signs and symptoms index and the compliance index. The correlation coefficient between the two indices is 0.52 ($p < 0.01$). As the degree of noncompliance increases, there is a corresponding increase in the total incidence of corneal staining, lens surface deposits, and subjective

symptoms. A graph of the signs and symptoms index vs. the compliance index is presented in Fig. 3.

DISCUSSION

To our knowledge this is the first reported detailed investigation of compliance levels among a population of contact lens wearers. In the population surveyed here, there was a very low level of patient compliance. Only 26% of patients could be shown to be fully compliant in all aspects of lens care; of the other patients, many were negligent in more than one procedure. This noncompliance is highly correlated with the occurrence of signs and symptoms of lenswearing difficulties that could not otherwise be explained. There is a strong relation between

TABLE 3. Relation of compliance index to observed signs and symptoms.

Signs and Symptoms	Compliance Index		χ^2	Significance Level
	(0 or 1) Good	(>1) Poor		
Staining				
not present	23	54		
present	3	52	11.33	0.001
Deposits				
not present	20	39		
present	9	48	4.38	0.05
Subjective symptoms				
not present	24	48		
present	2	30	7.28	0.01

the occurrence of corneal staining, lens surface deposits, and subjective symptoms, each considered separately, and the total recorded occurrence of these signs and symptoms with patient noncompliance. It is therefore clear that not only is patient compliance with lens care instructions very often incomplete, but also this noncompliance is reflected in high levels of lens-wearing problems. The subjects in this survey wore their contact lenses on a daily basis; the high incidence of noncompliance indicates that considerable attention should also be given to the area of instruction in the case of extended wear of contact lenses, where more serious complications in lens wear may arise.^{7,8}

The majority of noncompliant subjects in this survey were unaware of their inadequate procedures in lens care and maintenance. Frequently, the only feedback obtained on a patient's compliance involved the practitioner simply asking the patient whether they were still caring for their lenses appropriately. These patients, unaware of the faults in their techniques, responded positively. This aspect of noncompliance highlights the need for thorough questioning and even demonstration of care and maintenance techniques by patients at regular intervals to allow the early recognition and correction of any faults in care and maintenance techniques.

This low level of compliance among contact lens wearers is not surprising; in other health professions, noncompliance rates ranging up to 94% have been reported, depending on the nature of the study and the aspect of compliance under consideration.^{1-4,5} From these studies, several points about the general nature of patient compliance emerge: (1) the spectrum of noncompliance is varied, and can be total or occasional; (2) noncompliance tends to be more dependent upon particular situations than upon the basic tendencies of the individual (i.e., patient char-

acteristics are poor determinants of likely defaulters); and (3) every patient is a potential defaulter and compliance can never be assumed.¹⁻⁶

The reasons for patient noncompliance relate to the management regime (its cost, complexity, convenience, etc.) and to the way in which it has been presented to the patient (the patient-clinician relation, method of instruction, etc.). Strategies to improve compliance must address these basic causes, and are usually considered as being of four classes⁹: (1) educational, so that the availability of correct information is maximized; (2) improved communication techniques, so that information is provided in a brief, clearly categorized, and specific way (ideally using more than one medium to emphasize the importance of key areas). The use of instructional videotapes accompanying conventional verbal instruction in lens care and maintenance is an example of a recent development in this field; (3) organizational procedures, so that the cost, complexity, and nature of recommended care systems are tailored to the specific needs of individual patients. The use of all-purpose so-

COMPLIANCE INDEX

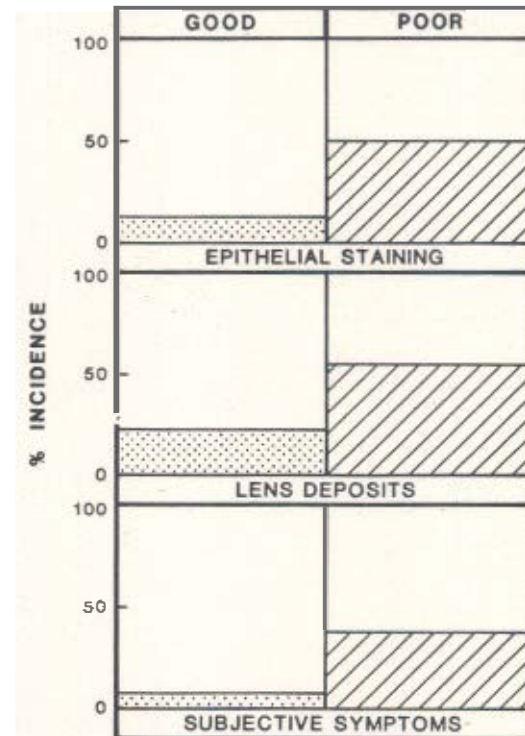


FIG. 2. Incidence of corneal epithelial staining, lens surface deposits, and subjective symptoms as a function of compliance index (Good, index = 0 or 1; Poor, index > 1).

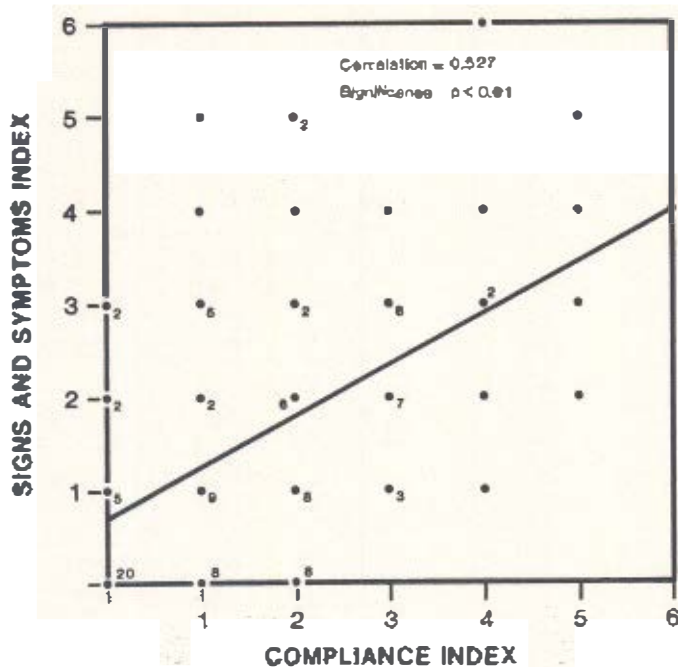


FIG. 3. Relation between compliance index and signs and symptoms index. Numbers beside each point indicate subject numbers with that combination of indices (no number indicates one subject only).

lutions is an example of a simplified lens care procedure that aims to promote patient compliance, although the efficacy of such solutions for many of the currently used lens materials is in some doubt;⁹ and (4) behavioral modification, including in this context the use of verbal or written commitments and the use of monetary reinforcement such as prepaid lens replacement programs.

As the consequences of noncompliance in extended lens wear become more serious for patient and practitioner alike, the adoption of more radical approaches, such as the use of release forms and mandatory lens exchange programs, is likely to become more common.¹⁰

In summary, the level of compliance by contact lens wearers with lens care instructions has been shown to be both low and highly related to difficulties that may ultimately limit lens wear. Such noncompliance should in many instances be amenable to correction by devoting attention to the method of patient instruction, the lens care regime chosen, the information supplied, and by regularly monitoring each patient's level of compliance. Attention to this often neglected aspect of contact lens patient care is in the interest of both practitioner and patient.

ACKNOWLEDGMENT

We acknowledge the helpful advice of Dr. Brian Brown, Department of Optometry, Queensland Institute of Technology, Brisbane, Australia.

REFERENCES

1. Ashburn FS, Goldberg I, Kass MA. Compliance with ocular therapy. *Surv Ophthalmol* 1980;24:237-48.
2. Ley P. Satisfaction, compliance and communication. *Br J Clin Psychol* 1982;21:241-54.
3. Davidson SI, Akingbehin T. Compliance in ophthalmology. *Trans Ophthalmol Soc UK* 1980;100:286-90.
4. Haynes RB, Taylor DW, Sachett DL. Compliance in Health Care. Baltimore: Johns Hopkins University, 1979.
5. Carr JE, Dengerink HA. Behavioural Science in the Practice of Medicine. New York: Elsevier, 1983.
6. Korsch BM, Negrete VF. Doctor-patient communication. *Sci Am* 1972;227:66-74.
7. Weissman BA, Mendino BJ, Pettit TH, Hofbauer JD. Corneal ulcers associated with extended-wear soft contact lenses. *Am J Ophthalmol* 1984;97:476-81.
8. Hassman G, Sugar J. Pseudomonas corneal ulcers with extended wear soft contact lenses for myopia. *Arch Ophthalmol* 1983;101:1549-50.
9. Greco A. All purpose solutions: compromise vs. compliance. *Int Eyecare* 1985;1:356-8.
10. Greco A. Extended-wear patient education. *Int Contact Lens Clin* 1985;12:143-6.

AUTHOR'S ADDRESS:

Michael Collins
Department of Optometry
Queensland Institute of Technology
G.P.O. Box 2434, Brisbane
Australia 4001