Prescribing spectacles: reasons for failure of spectacle lens acceptance

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Abstract
The objective of this descriptive study was to determine the frequency with which patients return for re-examination due to a failure of spectacle lens acceptance and to quantify the reasons for the failure. A random sample of patient records was reviewed to determine the rate of spectacle lens prescription. Spectacles reassessment records, completed after dispensing problems were dealt with were reviewed to determine the primary reason for the failure. Spectacles were prescribed for 58% of the 44,341 patients seen over 6 years. Of the 25,718 prescriptions written, 400 patients (1.6%) returned for reassessment. The most common problem was incorrect refractive error measurement (59%), followed by inability of the patient to adapt to an accurate refractive correction (10.3%), inadequate patient education regarding lens design (9.5%), pathology (9.3%), appliance problem (5.8%), transcription errors (1.6%) and other (4.5%). The frequency of failure to adapt to spectacle prescriptions is quite low and the most common reason for this failure is inaccuracy in the measurement of the refractive error.

Keywords: patient dissatisfaction, refractive error, spectacle adaptation, spectacle lens prescription, subjective refraction

Introduction
Prescribing spectacle lens correction is one of the main functions of a primary eye care practitioner. High patient satisfaction with the refractive correction is an important goal in practice because patient dissatisfaction can result in a decrease in the quality of the doctor-patient relationship which in turn results in lessened patient compliance and quality of outcome (Werner and Press, 2002). The dissatisfied patient may also actively deter other patients from seeking care from that practice (Werner and Press, 2002). It is therefore important to look at the reasons for patient dissatisfaction so that the information can be used to improve practice.

There are few studies reported in the literature on the frequency of failure of spectacle lens acceptance or the reasons for that failure. Riffenburgh et al. (1983) reported that 2.3% of patients returned after refraction because of dissatisfaction with the spectacles. The most common reason after the ‘miscellaneous’ category was described as a ‘power change’ followed by ‘errors by the optician’ and cataracts. In a study reported by Mwanza and Kabasele (1998), 2.8% of 432 patients returned after spectacles were prescribed. Of the 11 patients for whom a cause could be identified, the reasons were: errors by the optician (three), progressive myopia (two), intolerance to bifocals (one), cylindrical lenses (one), hyperopia from sudden onset diabetes (one), sinusitis (one), arterial hypertension (one) and cataract (one). No studies have examined the frequency of causes of poor spectacle adaptation in optometry practice.

The purpose of this study was to determine the frequency of patients returning for a reassessment in an optometry clinic because of a failure in adapting to a spectacle lens correction and to quantify and describe the causes of the identified problems.

Methods
Subsequent to receiving institutional ethics clearance, data regarding the reasons for failure of spectacle lens acceptance were collected by reviewing the Spectacle Reassessment Records (Figure 1) collected from the University of Waterloo, School of Optometry Clinic during the period of 1 January 1998 until 31 December 2003. The procedures for dispensing corrective lenses were reviewed, as was a random sample of patient records. The Spectacles reassessment records were completed by the optometrist as part of the process of reassessing the patient after a dispensing problem was addressed. This reassessment was only performed if the patient agreed to have a follow-up visit.

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2004. When a patient reports a failure to adapt to the spectacle correction, he/she is first seen in the optical dispensary. The spectacles are verified for accuracy and the frame is adjusted if needed. Most problems from lens design and counselling on use of the lenses are addressed at this visit. If these actions fail to remediate the problem then the top portion of the Spectacle Reassessment Record is completed and the patient is booked an appointment in the Primary Care Clinic for a reassessment. The patient is seen by a fourth year optometry intern who is supervised by an optometrist. The bottom half of the Spectacle Reassessment Record is completed after the Primary Care examination. One copy of the form remains in the patient record, a second copy goes to the prescribing intern (for formative feedback) and the third is reviewed by the Head of the Primary Care Clinic (for quality assurance).

During this 6 year period, 400 Spectacle Reassessment Record forms were completed and distributed. Each of these forms was reviewed by the author and the primary reason for the reassessment was identified. The reasons for the failure to adapt to the spectacle correction were divided into seven categories after reviewing the data: failure to adapt to correctly measured refractive correction, error in measuring the refraction, problem with patient education on lens design and use, transcription error, pathology reducing vision, appliance problem not corrected in the original dispensing visit, and other. Records were excluded when it was not possible to determine the reason for the failure to adapt to the spectacle correction, or the patient had adapted at the time of the examination.

In order to determine the frequency of the reassessments, 78 patients’ records that had been randomly

Figure 1. Spectacle Reassessment Record.
selected from the patients seen in the Primary Care Clinic for quality assurance purposes were reviewed. These files were from patients seen during two consecutive academic terms (between August 2003 and April 2004). These patient records were reviewed to determine the rate of spectacle prescription when conducting complete oculo-visual assessments thus partial examinations were excluded. The number of spectacle prescriptions written during the 6-year period was estimated by multiplying the prescription rate with the number of patients seen for complete oculo-visual assessments in the time period.

**Results**

*Estimating the failure rate of spectacle lens acceptance*

The prescribing rate for the 78 randomly selected patients' records was used to estimate the number of prescriptions written during the 6-year period (1998–2004). A prescription was written for 45 (57.7%) of the 78 patients who received a full oculo-visual assessment. There were 44,341 patient visits for a full oculo-visual assessment during the 1998–2004 period. At an estimated prescribing rate of 57.7%, there were approximately 25,585 prescriptions written during this period. Four hundred (1.6%) returned for a re-examination because of failure of spectacle lens acceptance.

Of the 400 Spectacle Reassessment Records reviewed, 22 were eliminated from the analysis. In 14 of the 22 deleted records, it was not possible to determine the reason for the failure to accept the spectacle lens correction and in eight records the patient had adapted by the reassessment appointment. Of the remaining 378 records; Figure 2 shows that the most common reason for failure of spectacle lens acceptance was incorrect measurement of the refractive error which accounted for 223 records (59.0%). The remaining six reasons for not accepting the prescribed spectacles were: failure to adapt (39 records; 10.3%), ineffective education regarding lens design (36 records; 9.5%), ineffective education regarding visual performance in the presence of pathology (35 records; 9.3%), appliance problems (22 records; 5.8%), transcription errors (six records; 1.6%) and other problems (17 records; 4.5%). Several of these problems could be further subdivided to identify the contributing factors.

*Errors in measuring refractive error*

Further analysis of the 223 records, in which the refractive error was incorrectly measured, revealed seven specific types of errors (Figure 3): over-plused at distance (59 records; 26.4% of the 223 records), inaccurate cylinder power (41 records; 18.4%), over-minused at distance (31 records; 13.9%), over-minused addition (29 records; 13.0%), binocular vision problem (24 records, 10.8%), over-plused addition (23 records; 10.3%) and inaccurate cylinder axis (16 records; 7.2%).

*Failure to adapt to an accurate prescription*

Six causes were identified for the 39 patients who failed to adapt to an accurate refractive correction: cylinder power change (19 records; 48.7%), more plus in the distance refraction (six records; 15.4%), more minus in the distance refraction (five records; 12.8%), cylinder axis change (four records; 10.3%), more plus in the addition (three records; 7.7%) and more minus in the addition (two records; 5.1%).

*Ineffective education regarding lens design*

There were two types of ineffective education regarding lens design. Twenty-nine (80.6%) of the 36 records in this category occurred because of a dissatisfaction with the choice of the addition (straight top bifocal or trifocal or progressive addition lens). In the remaining seven records (19.4%), the patient required further training on the proper use of the lens.

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![Figure 2](image1.png)  
**Figure 2.** Spectacle re-assessment primary outcome.

![Figure 3](image2.png)  
**Figure 3.** Breakdown of refractive error inaccuracies.
Appliance problems

The 22 records representing appliance problems could be subdivided into two sub-categories. In 10 records (45.4%), it was a frame adjustment problem and in 12 records (54.5%), it was a lens problem in terms of base curve, segment height, anti-reflection coating or lens warpage.

Other problems

Other reasons (17) for presenting for reassessment included: failure to refract the patient before prescribing, ocular or systemic disease causing a subsequent change in refractive error, delayed filling of the prescription (6 months to 1 year after refraction) when the refractive error had changed in the interim, lack of appreciation of change in the refractive correction, and improvement confirmed once demonstrated objectively.

Discussion

The frequency of patients returning for re-examination after prescribing spectacles was found to be quite low at 1.6%. This is somewhat lower than the study (2.3%) carried out by Riffenburgh et al. (1983) or Mwanza and Kabasele’s (1998) study (2.8%) in their ophthalmology practices (Riffenburgh et al., 1983; Mwanza and Kabasele, 1998). The lower rates are impressive when one considers that they occurred at an optometry training clinic. The result from this study would be higher if the number of patients presenting with problems of spectacle frame fitting, lens design acceptance or counselling on use were included in the analysis. This group includes patients who fail to adapt to progressive addition lenses which can represent a significant portion of patients returning for failure to adapt to the spectacles (Sullivan and Fowler, 1989). Patients with this type of problem were first seen in the optical dispensary and the majority of these problems were dealt with prior to re-examination.

It should be noted that this study does not capture those patients who chose to seek remediation outside the School rather than return for a re-examination. An analysis of the age of patients seen in the optometry clinic carried out early in the study period (1998–2000) showed that the age distribution of the population seen in the clinic is very similar to that seen in optometric practice in Ontario.

The most common reason for failure of spectacle lens acceptance in this study was the incorrect measurement of the refractive error (59.0%). This is not entirely surprising as the refractions are done by third or fourth year optometry students who are still refining their skill. Within this category of problem the most common reason for dissatisfaction was over-plusing the distance refraction accounting for approximately one in four refraction errors. This finding is supported by Miller et al. (1997) who showed that a significant number of participants in their study were dissatisfied with plus focal errors in distance refraction as small as +0.25 D. Atchison et al. (2001) looked at the effect of under and over refractive correction on visual performance and spectacle lens acceptance. They found that the subjects who wore a test pair of spectacles with a +0.50 D monocular or binocular error in the refraction (i.e. over-plused by this amount) had the highest rate of rejection in young adults. A significant number of participants also found the −0.50 D monocular error (over-minused by this amount) to be unacceptable. There was a lower rate of rejection of the test pairs with the −0.50 D binocular error or the +0.25 D right lens/−0.25 D left lens errors. Their results are consistent with the findings from this study in which about twice as many distance refraction errors were over-plused (59) than over-minused (31). This difference is expected in younger patients as they can accommodate to compensate for an over-minus error.

Cylinder power inaccuracy accounted for approximately one in five refraction errors and was the second most common reason for failure of acceptance in the refractive error measurement group. In this group the minus cylinder power was either under or over corrected. More patients returned for reassessment for this reason than for cylinder axis inaccuracy which was considerably less common (<1 in 12 errors).

There was a slightly greater tendency to over-minus the addition (approximately 13%) than over plus it (approximately 10%). One common situation leading to over-minusing the addition occurred when the patient had a cataract-induced myopic shift. In these situations, the habitual effective addition was higher than the nominal addition. This was not always taken into consideration when prescribing the addition resulting in a lower than optimal prescribed addition. Also, with the popularity of progressive addition lenses, patients are able to tolerate more plus in the addition than is optimal more easily than they could with conventional straight-top bifocal lenses. This could explain why fewer patients found the addition was ‘too strong’.

The binocular vision problem category included prescribing prism for vertical and lateral deviations as well as dealing with anisometropia. The anisometropia problems most often occurred with new unilateral pseudophakes. In the region where the optometry school is located, patients wait approximately six months between unilateral cataract surgeries. If they have significant bilateral ametropia before surgery, then there is often a problem with aniseikonia if the surgeon sets the post-operative refraction close to plano. This surgically induced aniseikonia most often results in vertical
diplopia in the reading position and can be dealt with either with iseikonic lenses or a slab-off prism design. More attention to the potential for aniseikonia problems should be paid when prescribing for new unilateral pseudophakes.

Of the people who failed to adapt to their spectacles subsequent to an accurate refraction (17.5%) almost half struggled with a change in the cylinder power. This is an expected finding because changes in cylinder power can cause spatial distortions that cause asthenopia in more sensitive patients (Brookman, 1996). Failure to adapt to more plus in the distance refraction was the second most common complaint in this category (15.4%). This is also not surprising as some of the younger patients are unable to relax their accommodation to accept the full plus distance correction comfortably. Using a trial frame to ensure that the patient is comfortable with the refraction and having the person look across the waiting room or out of a window for true infinity would be helpful in avoiding these problems.

The third category of failure of lens acceptance was patients who were unhappy with the design of the lens (bifocal, trifocal or progressive addition lens) or were uncertain how to use the lens properly. Having said that, some patients will not be able to adapt to a particular lens design and this can only be known after a period of lens use. It is important that the presbyopic patient be fully informed regarding lens design options and their use.

In the fourth category of failure of lens acceptance, pathology reducing vision, patients were expecting better visual performance with their spectacles than they were able to achieve due to an ocular pathology such as cataracts or macular degeneration. In these cases additional counselling was required and some patients were referred for a cataract surgery consultation when appropriate. Patients with underlying pathology may not appreciate a change in refraction even if the high contrast acuity is improved. This is often because of reduced contrast sensitivity and a decreased sensitivity to change.

The majority of the problems with the spectacle frame or lens manufacturing were dealt with in the optical dispensary. This resulted in a very low number of patients presenting with problems that could be attributed to frame adjustment problems or lens manufacture problems. While it would be interesting from a quality control perspective to look at the rate of return for these reasons, that data was not available from this study design. Fortunately, transcription errors were relatively uncommon. It is important to ensure that record keeping is accurate and these errors are kept to a minimum.

In summary, re-examinations following failure to accept the spectacle lens prescription were found to be relatively infrequent at 1.6% of all prescriptions written. The most common problem identified was a failure to measure the refractive error accurately. Following this, failure of adaptation to the correctly measured refractive error, problems with educating patients on lens design and use, and the impact of pathology on vision were the most common problems identified. Attention to these sources of problems can help in developing and maintaining a strong primary eye care practice.

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References
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