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CANADIAN JOURNAL *of* OPTOMETRY | REVUE CANADIENNE D'OPTOMÉTRIE

EST. 1939 VOLUME 79 NUMBER 1

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CANADIAN JOURNAL *of* OPTOMETRY
REVUE CANADIENNE D'OPTOMÉTRIE
Vol 79, No 1
Spring/Printemps 2017
ISSN 0045-5075
The *Canadian Journal of Optometry* is the official publication of the Canadian Association of Optometrists (CAO) / La Revue canadienne d'optométrie est la publication officielle de l'Association canadienne des optométristes (ACO) : 234 Argyle Avenue, Ottawa ON, K2P 1B9. Phone 613 235-7924 / 888 263-4676, fax 613 235-2025, e-mail info@opto.ca, website www.opto.ca. Publications Mail Registration No. 558206 / Envoi de publication – Enregistrement no 558206.
The *Canadian Journal of Optometry / La Revue canadienne d'optométrie* (USPS#0009-364) is published four times per year. Address changes should be sent to CAO, 234 Argyle Avenue, Ottawa, ON K2P 1B9.

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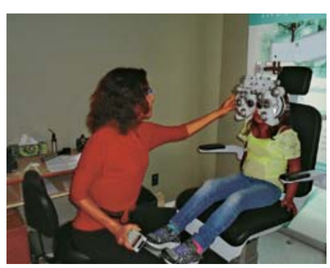

On the Cover

A young student at the M'Chigeeng First Nation Elementary School receives an eye examination

B. Ralph Chou, MSc, OD, FAAO
Editor-in-Chief

We begin 2017 with a countdown towards the Canadian Association of Optometrists' biennial Congress in Ottawa, where many members will gather for several days of reunions and continuing education, culminating in the Canada Day festivities on Parliament Hill that mark our nation's sesquicentennial birthday party.

Looking back over the past 50 years, Canada and our profession have seen many changes. In 1967, as the lyrics of Bobby Gimby's centennial song Canada wafted over the radio and school announcement systems, 20 million Canadians looked forward to completion of the Trans-Canada Highway and the opening of Expo 67 in Montreal. Bilingualism and biculturalism became official government policy despite vociferous resistance. The Maple Leafs won their last Stanley Cup. Optometry was working towards acceptance as a true health profession as its once private College in Toronto prepared to move to the University of Waterloo and become a public institution.

Despite the horrific event last January in Quebec City, Canada today largely embraces a diverse multicultural society that welcomes immigrants and refugees more than ever before in its history, swelling our population to 36 million. Optometry is no longer a "drugless" health discipline, and is accepted as an integral part of primary health care from coast to coast to coast. Our two university-based Schools of Optometry and Vision Science have solid academic and clinical reputations nationally and internationally.

Despite optometry's advances, there still remain unmet vision needs in Canada. In this issue, Dr. Chris and colleagues discuss one gap they found in First Nations schools, and Dr. Andrew Rixon presents a review of ocular hypertension. An Optocase Mini on chalazion and two short articles on practice management round out this issue. Later this year, look for our supplement on glaucoma.

If you haven't gotten around to it, please consider registering for the CAO Congress. I look forward to seeing many of you in Ottawa in June. ●

B. Ralph Chou, MSc, OD, FAAO
Rédacteur en chef

Nous amorçons l'année 2017 par un décompte pour le Congrès biennal de l'Association canadienne des optométristes, qui aura lieu à Ottawa, où bon nombre de membres se rassembleront pendant plusieurs jours pour assister à des réunions et des séances de formation continue, et qui se terminera par des célébrations de la fête du Canada sur la Colline du Parlement soulignant le 150e anniversaire de notre pays.

En jetant un regard sur les 50 dernières années, le Canada et notre profession ont beaucoup évolué. En 1967, les paroles de la chanson du centenaire de Bobby Gimby intitulée Canada jouant à la radio et dans les écoles au moyen des systèmes d'annonce, 20 millions de Canadiens attendaient avec impatience l'achèvement de la Transcanadienne et l'ouverture de l'Expo 67 à Montréal. Le bilinguisme et le biculturalisme faisaient l'objet d'une politique officielle du gouvernement malgré beaucoup d'opposition. Les Maple Leafs remportaient leur dernière Coupe Stanley. L'optométrie tentait d'être acceptée comme une vraie profession de santé, alors que son collège à Toronto, un collège privé à l'époque, se préparait à déménager à l'Université de Waterloo et à devenir un établissement public.

Malgré le terrible événement survenu à Québec en janvier dernier, le Canada d'aujourd'hui adopte une société multiculturelle diverse qui accueille les immigrants et les réfugiés plus que jamais dans son histoire, faisant croître notre population à 36 millions de personnes. L'optométrie n'est plus une science de la santé « sans médicaments », et est acceptée comme faisant partie intégrante des soins de santé primaires à l'échelle du pays. Nos deux écoles d'optométrie et des sciences de la vision universitaires sont fort réputées sur le plan académique et clinique, tant à l'échelle nationale qu'à l'échelle internationale.

Malgré le fait que l'optométrie a progressé, des besoins en matière de vision demeurent insatisfaits au Canada. Dans ce numéro, le Dr Chris et ses collègues discutent de l'écart qu'ils ont observé dans les écoles des Premières Nations, tandis que le Dr Andrew Rixon présente un examen de l'hypertension oculaire. Un mini-cas d'Optocase sur le chalazion de même que deux courts articles sur la gestion de la pratique complètent ce numéro. Plus tard cette année, nous publierons notre supplément sur le glaucome.

Si vous n'avez pas eu l'occasion de le faire, nous vous invitons à vous inscrire au Congrès de l'ACO. J'ai hâte de voir bon nombre d'entre vous à Ottawa en juin. ●

Results of an Environmental Scan to Determine the Level of Uncorrected Refractive Error in First Nations Elementary School Children in Ontario

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Abstract

A survey was developed and used to determine the level and quality of vision care services available to First Nations elementary school children across Ontario, and to indirectly determine the level of uncorrected refractive error in First Nations children. Overall, the total survey results showed that 1 child in 4 wore glasses. The results from the survey indicated that remote communities that had a visiting optometrist were more likely to have fewer cases of uncorrected refractive error than non-remote communities. The results suggest that in-community comprehensive eye exams delivered on a regular basis by visiting optometrists would be the most effective way of improving the vision and eye health status of First Nations children.

Results of an Environmental Scan to Determine the Level of Uncorrected Refractive Error in First Nations Elementary School Children in Ontario

According to Statistics Canada's 2011 National Household Survey, just over 300,000 Indigenous people reside in Ontario, accounting for nearly 22% of the total Indigenous population of Canada and 2% of Ontario's total population. Furthermore, there are just over 200,000 First Nations people in Ontario, and thus they represent the majority of the Indigenous population within the province and comprise nearly 25% of all First Nations people in Canada. Of First Nations with registered Indian status, 37% live on a reserve.[1] *Sixty percent (60%) of Canada's First Nations children living on a reserve live in poverty, which is more than three times Canada's overall child poverty rate of 18%*.[2]

A major health disparity exists between Indigenous peoples and the overall population in Canada, such that it can be viewed as a national epidemic.[3] It is well established that First Nations, Métis and Inuit people experience disproportionately high rates of chronic diseases, suicide, abuse, addiction and mental health issues relative to the overall population.[4,5] This is often associated with social determinants of health — as recognized by the World Health Organization — such as lower socio-economic status, fewer employment and education opportunities, and reduced access to basic goods and services such as nutritious food and clean water.[5,6] Such inequities, in concert with the intergenerational impacts of colonialism, via the 1876 Indian Act and the residential school system, create significantly poorer health outcomes.[6]

One such outcome includes impaired vision and eye health. A higher prevalence of astigmatism has been reported in Native American and First Nations children across several studies, in addition to worse visual acuity and worse compliance with wearing needed glasses.[7,8] A key marker of the eye health in a community is uncorrected refractive error, which is defined for the purposes of this study as the percentage of children who need glasses but either do not have or do not wear their glasses. Refractive error is important because it can lead to long-term vision impairment if not diagnosed and treated in a timely manner,[8] and in children can disrupt learning and thus compromise school success.

Previous pilot research by the lead author identified a very high rate of uncorrected refractive error in a study of elementary school students (Junior Kindergarten (JK) to Grade 8) attending two Ontario First Nations elementary schools in the Sagamok and M'Chigeeng First Nations. In this two-school study, 250 children underwent comprehensive eye examinations and the incidence of uncorrected refractive error was found to be 86%. Only 4.4% of all the children examined (11 of 250) were actually wearing glasses at the time of their examination (see Appendix

1). Studies have indicated that approximately 25% of children from JK to Grade 8 can be expected to be wearing glasses.[8] Since uncorrected refractive error is a preventable cause of visual impairment, it is a priority in the World Health Organization's Vision 2020 initiative to eliminate avoidable blindness.

Despite this evident health disparity, there is a lack of recent studies on the prevalence of Aboriginal eye health and vision disorders in the literature, particularly literature specific to First Nations children. However, the need to diagnose and correct vision problems early is critical in children, since early intervention significantly reduces the risk of amblyopia and vision loss.[9-12] Further, given that Aboriginal children have been described as visual learners[13], and that much of a child's learning is based on vision, uncorrected refractive error has a significant impact on reading, writing, and the overall educational experience.[9] Many children accept their poor vision as normal, and parents, caregivers and teachers may not be aware of the often subtle signs of vision impairment, such as headaches or eye strain, a short attention span or losing one's place when reading. Thus, delayed or poor access to vision care poses a significant barrier to literacy, education, and social development. [8]

Dr. Dana Blakolmer examining a young student at the M'Chigeeng First Nation Elementary School

This gap reflects an unmet need, and warrants evaluation of the current eye health status and vision care services provided to First Nations children in Ontario, including accessibility to, and use of, timely and regular comprehensive eye examinations. However, this requires a critical exploration of the unique cultural, economic, and geographical profile of each respective First Nation, and the resulting barriers—individual and shared— that manifest in response.

Various international studies have shown that children from families with low incomes and lower levels of education are more likely to experience visual impairments and less likely to be diagnosed and treated for vision problems.[14-16] Given that a greater proportion of Aboriginal children come from disadvantaged families relative to the overall population, they are consequently at a higher risk for untreated vision disorders.[14] A lack of access to care has also been reported as a major factor that affects vision health in children, and has been previously reported to be a primary cause of uncorrected refractive error.[15,17] The vast geography of Canada should also be considered; many First Nations people live in rural and northern communities where the nearest optometrist is often dozens if not hundreds of kilometers away. When this is combined with little or no compensation for travel expenses, inconsistent vehicle access and frequently dangerous travel conditions, the challenges are magnified. These realities are often underappreciated.

One potential solution that has been considered is vision screening performed by community health workers. A recent 2015 study conducted at Lac Seul First Nation by researchers from The Hospital for Sick Children and McMaster University showed that even a well-designed vision screening program was not adequate for a remote First Nations school population and that full comprehensive eye exams should be the gold standard of care (see

Appendix 2). A comprehensive eye examination includes an assessment of ocular and medical history, visual acuity, eye co-ordination, refraction and eye health. This thorough evaluation should ensure that any eye problem will be identified.

The optimal solution is to establish partnerships between optometrists and First Nations, which we argue should be the gold standard of care given the unique geographical circumstances. However, with limited human resources and government funding, it is imperative that the allocation of optometrists to communities be based on evidence. We must first determine which communities have the greatest need and then allocate resources accordingly, as the most efficient way to meet population requirements.

This study aimed (A) to estimate the relative need for services based on levels of corrected refractive error compared to expected norms, and (B) to determine the level and frequency of vision care services being delivered to First Nations children attending Band-operated elementary schools encompassing JK to Grade 8 in Ontario. In combination, this information has the potential to guide the allocation of services to First Nations.

METHODOLOGY

Ethical Clearance

The study protocol was reviewed by respective representatives at the Chiefs of Ontario Organization and the Vision Institute of Canada. It was also reviewed and approved by the Research Ethics Board of Laurentian University on October 9, 2015.

Subjects

In collaboration between the Chiefs of Ontario, the Vision Institute of Canada and Laurentian University, a survey was developed and implemented. The survey contained 13 items, pertaining to eye health care services provided to Ontario's First Nations children attending Band-operated elementary schools. Each of the 77 First Nations elementary schools in Ontario encompassing JK to Grade 8 were invited to participate, representing approximately 9,500 children. Schools that also provided high school education did not include demographics for students in grades 9 to 12.

Procedure

The study information page (see Appendix 3) and survey (see Appendix 4) were emailed by Chiefs of Ontario to the education directors of each Band-operated school on October 26, 2015. The support of the Education Directors was required to email the electronic survey web-link to their respective school principal(s). This step was necessary given the inconsistency of school principal email contact information in the Chiefs of Ontario database.

Participants were provided two options for completing the survey. The first was to print the survey attached to the email and complete the items in a written format, submitting it via fax to the Vision Institute of Canada number provided on the study information page. Alternatively, an online version was available through REDCap — a secure online survey database — which was accessed through a link on the information page.[18] As explained on the information page, submission of the survey was considered implied consent.

The survey required that a representative from each school—such as the Education Director, school principal, teacher, or health nurse—go to each classroom and count the number of children who were wearing glasses, and the number of children who were not wearing glasses on the day of the count (such that the numbers counted were not necessarily representative of the actual school enrollment). The remainder of the survey could be completed independently of data collection, and focused on information regarding the type and frequency of vision services provided to the community, and the role of the school in identifying children in need of vision assessment.

Follow-up phone calls were conducted after distribution of the survey by two student assistants from Laurentian University, who telephoned each school principal to ensure that each school had received their survey from their Education Director. During these follow-up phone calls, some principals provided an email address for the survey to be emailed directly to them, because they had not yet received a copy from their Education Director. If the school principal could not be reached after 3 or more attempts by December 22, 2015, the school was placed on a mailing list for the survey to be mailed directly to the school from the Vision Institute of Canada. Due to the number of schools that reported not receiving the survey from their respective Education Directors, this step was undertaken to ensure that each school had the opportunity to participate.

Data Analysis

Data collection officially closed on February 12, 2016, after which the survey was taken offline. The percentage of children wearing glasses was obtained by dividing the number of children who were wearing glasses by the total number of children in the school the day the count was completed (i.e., the sum of the number of children wearing and not wearing glasses). Based on attendance on that specific day, this number may or may not have been equal to total school enrollment. Previous studies have indicated that approximately 25% of children from JK to Grade 8 can be expected to be wearing glasses.[8] By comparing each school's reported percentage with this expected value, we can determine, in a very basic way, which schools may be in need of in-community optometry care.

In addition to the overall group, the data were also organized into four main categories: whether the school had a visiting optometrist, whether the school had any other form of vision assessment (for instance, on-reserve screening by a nurse practitioner, school nurse, teacher, etc.), whether the students saw an off-reserve optometrist, and whether the school was located in an isolated fly-in community.

Data Presentation

A one-page report that summarized the findings of this study was given to all Band-operated elementary schools in Ontario. The reports were specific to each community, and stated where the nearest optometrists were located, the rate of uncorrected refractive error at the school, and the school's individual results in comparison to both the study and expected norms. Two styles of reports were employed, one in a written format and one with additional infographics and visual elements to make data available in a culturally appropriate manner.

RESULTS

Description of Respondents

In total, 33 of the 77 (43%) First Nation elementary schools responded to the survey, 19 via fax and 14 through the on-line REDCap survey (Figure and Table 1).

Table 1: *Response Rates from Remote Communities vs. Non-Remote Communities*

Number who responded		Number of communities	Number who responded	Response Rate
Remote	Yes	32	12	37.5%
	No	45	21	46.7%
Total		77	33	42.9%

Of the 33 completed surveys, only four schools completed the survey independently, without any contact from Laurentian.

Of the 73 schools contacted by Laurentian University, 24 completed the survey, 5 declined and 44 did not respond.

Of the 24 schools that completed the survey, 17 required only one email, four required two follow-up emails and three required three emails.

Of the 44 schools that did not respond to the survey, those that provided their email received up to three reminder emails regarding their survey completion status. After these three follow-up emails, these schools were not contacted again.

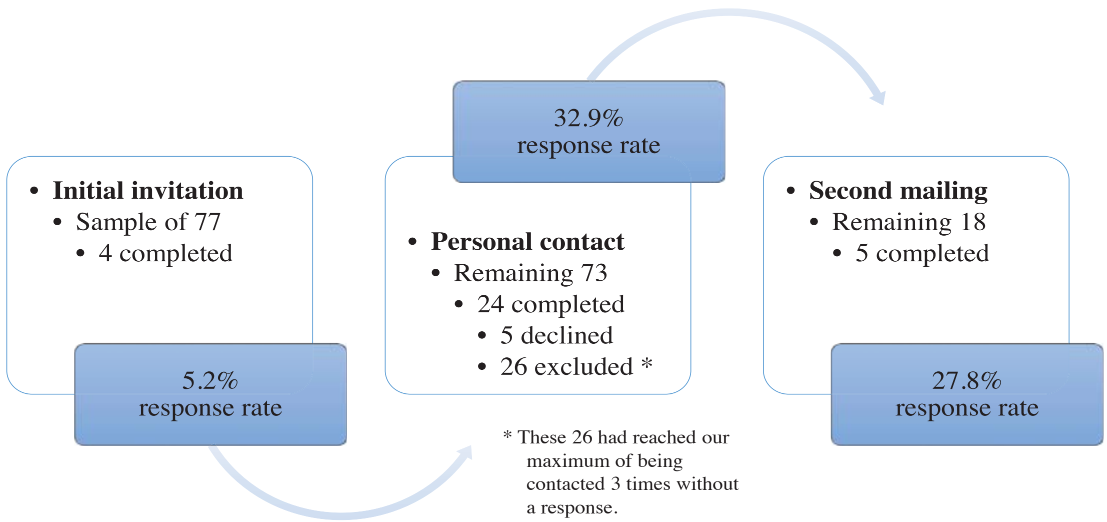
For the 18 schools that could not be reached by either phone or email, printed copies of the information letter and survey were mailed by the Vision Institute of Canada. Of these 18 schools, five later replied.

With our survey, we found that an average of 25% of students were wearing glasses (Table 2). This suggests that, in the aggregate, there is very little uncorrected refractive error. However, because of the importance of geographic location on access to services, we compared the rates of vision correction in remote communities to those in road-accessible communities. The results are shown in Table 3, which also compares the rates in communities with a visiting optometrist to those in other communities.

DISCUSSION

Table 1 shows that 32 First Nations elementary schools in Ontario are located in remote communities and the remaining 45 are located in rural, urban or peri-urban communities. Fly-in communities and those that are accessible only via air and/or ice roads were considered remote. Of the 32 schools in remote communities, 12 (37.5%) responded to the survey. Of the 45 schools in non-remote communities, 21 (46.7%) responded to the survey. These data suggest that students living in a remote First Nations community may have better access to vision care services. The lower response rate seen for remote communities may indicate that there was less incentive to respond to the survey in comparison to non-remote communities. This may be due to the fact that the allocation of funds to First Nations is influenced by geographic factors such as the distance to the nearest service centre, and thus isolated communities are given more attention than non-remote communities.[19] However, in some cases, non-remote First Nations communities may still be located many kilometers from comprehensive vision care services. Location and travel expenses were the main barriers to attaining proper vision care services reported by non-remote communities. The average distance from all 33 reporting communities to the nearest optometrist was 196 km.

Figure 1: *Survey Response Rates*



Our primary aim was to compare the rates of vision correction to the expected norms, which might suggest a need for services. The pooled results presented in Table 2 indicate that the percentage of children wearing glasses in all of the 33 responding schools was 25.3%, which is very similar to the expected healthy rate reported in the general population.8 However, based on the findings of the two-school study mentioned in the Introduction, this value was expected to be considerably lower (approximately 4.4%). Since this study used a self-reported survey to collect data, certain forms of bias may explain why this result is not truly representative of the population. For instance, the data were provided by school representatives, which increases the risk of a social acceptability bias. It is possible that the survey respondents unintentionally provided data that portrayed their elementary school or First Nation community in a more favourable manner. Furthermore, school representatives were also selected by the school principal and may have received their instructions second- or third-hand, and thus may not have had a concrete understanding of the purpose of the study or the importance of accurate data collection. This may have affected the overall validity of the study and the findings may not be generalizable to the entire population.

Table 2: *Percentage of Children Wearing Glasses for Each Participating Elementary School*

First Nations Community (Y) indicates that an optometrist visits the community		Actual student enrollment	Number with glasses	Number without glasses	Percent-age wearing glasses (%)
Aamjiwnaang First Nation		11	0	11	0
Aroland First Nation		91	21	53	28
Chippewas of Georgina Island First Nation		15	2	13	13
Chippewas of Nawash First Nation	(Y)	71	14	53	21
Chippewas of Rama First Nation		160	16	130	11
Curve Lake First Nation		53	9	44	17
Deer Lake First Nation	(Y)	256	88	168	34
Eagle Lake First Nation		27	3	24	11
Fort Albany First Nation	(Y)	194	44	30	59 (?)*
Fort Severn First Nation	(Y)	85	33	50	40
Grassy Narrows First Nation		187	30	157	16
Keewaywin First Nation	(Y)	103	8	95	8
Long Lake #58 First Nation		97	4	7	37 (?)
Mattagami First Nation		31	10	21	32
Mississaugas of the New Credit First Nat.		126	20	105	16
Mohawks of Akwesasne First Nation	(Y)	297	52	189	22
Moose Cree First Nation		36	17	19	47
Neskantaga First Nation	(Y)	49	12	37	24
Nibinamik First Nation	(Y)	84	8	52	13
North Caribou Lake First Nation	(Y)	148	18	130	11
North Spirit Lake First Nation	(Y)	78	26	52	33
Northwest Angle #37 First Nation		6	3	3	50
Ojibways of Onigamig First Nation		46	16	30	35
Pikangikum First Nation	(Y)	750	250	400	38 (?)
Sagamok First Nation		178	21	158	12
Shawanaga First Nation		23	5	18	22
Sheshegwaning First Nation		10	2	8	20
Shoal Lake #40 First Nation		33	7	26	21
Temagami First Nation		33	7	24	23
Wabaseemoong First Nation		300	52	200	21
Wabigoon Lake First Nation		12	3	9	25
Webequie First Nation	(Y)	144	18	126	13
Weenusk First Nation		28	7	21	25
TOTAL		3762	826	2463	Av=25.3%

*NOTE: (?) indicates data that may reflect inaccurate reporting but is included in the final results.

Table 3: *Percentages of Students Wearing Glasses Organized into Specific Groups*

	Percentage of students wearing glasses	Percentage of students counted (relative to total enrollment)
Is the community fly-in (no year-round road access)?		
Yes	34%	86.4%
No	20%	86.7%
Do families visit an optometrist off the First Nation?		
Yes	29%	87.1%
No	24%	84.4%
Is there any other form of vision assessment?		
Yes	25%	78.9%
No	25%	90.7%
Does an optometrist visit the First Nation?		
Yes	29%	86.5%
No	19%	91.8%

When we explored the rates of vision correction across communities, we recognized that some areas had a greater need for services, based on a lower percentage of students with vision correction. Based on the results in Table 3, 34% of students who attended an elementary school located in a fly-in or isolated community were wearing glasses, which is greater than the expected average value of 25%.[8] On the other hand, 20% of the students who attend a non-isolated Band-operated school were wearing glasses, which is below the expected average. These findings suggest that fly-in (or remote) First Nations communities are more likely to be provided with sufficient vision care services in comparison to non-remote communities. Table 3 also suggests that communities that have the capacity to visit an optometrist outside of a First Nations community have a higher percentage of students wearing glasses than those that do not. However, in families who do not visit an optometrist, 24% of children wear glasses, which is still very close to the expected average.

Overall, 25% of students were wearing glasses regardless of any other form of vision assessment (e.g., a simple screening test performed by a teacher or school nurse), which is consistent with the expected norm. Finally, the percentage of students in a community with a visiting optometrist who were wearing glasses (29%) was greater than the percentage of glasses-wearing students who did not have access to a visiting optometrist (19%). This suggests that the visiting optometrist model is highly effective.

In general, Table 3 shows that the percentages of children wearing glasses in each category are relatively high. However, none of the groups accounts for 100% of the student population. The sample selection of 33 schools (representing 43% of the target population) did not account for all of the students who attended each school. Many of the schools surveyed had high absence rates on the day data were collected. It is interesting to speculate that healthy children attend class on a regular basis and therefore are most likely to have been included in this study. This would increase the overall percentage of children wearing glasses and leads to a selection bias. The sample statistic used for analysis (population of healthy students) was not properly randomized and is therefore not representative of the entire population. Furthermore, the 33 schools examined in this study (3,762 total students) accounted for less than 39% of the total population of students in all 77 First Nation elementary schools in Ontario (9,698).

LIMITATIONS

This study was challenging and we recognize that various methodological limitations must be considered when interpreting the results.

First, schools were approached indirectly, via two third-party agencies, in that the letter of invitation was sent from the Chiefs of Ontario and follow-up was provided by Laurentian University. This indirect approach was based on our partnership with the Chiefs of Ontario and designed to ensure that our research was relevant and respectful, but may have led to some confusion on the part of the respondents. Furthermore, the invitations were initially sent to the Education Directors, who then forwarded the materials to the respective school principals. This indirect method may have resulted in some potential participants not receiving the survey. This concern was confirmed by several schools, who reported never having received the survey, and likely contributed to our small sample size.

Second, it was difficult to contact a principal or appropriate representative by phone. Many were traveling or otherwise busy with school programming. Further, many school secretaries were not familiar with the study and some felt uncomfortable providing an email address. Thus, there were many barriers to ensuring that the survey was received.

These limitations reflect some of the realities of conducting survey research with First Nations communities. Despite these limitations, we believe our results are important because they represent a significant advance in the level of information available to date, and provide evidence of need at a community level, which may inform the allocation of limited resources.

Dr. Catherine Chiarelli providing a comprehensive eye exam to a young student at Sagamok First Nation

RECOMMENDATIONS FOR FUTURE RESEARCH

Several avenues for improvement are apparent. A copy of the survey and information letter should be mailed directly to the respective school principals. Follow-up by phone is time-consuming, but important, since this method attained a 32.9% response rate. A second mailing is also valuable and attained a 27.7% response rate among schools that had not responded to other approaches.

In addition, community leadership should be informed of the study goals and procedures in advance. This might improve participation, or at least encourage a community-level evaluation of the adequacy of vision care services available. Further, some principals may have felt uncomfortable making a decision to participate in research without first soliciting approval or awareness of the band council.

It may also be of benefit to have a staff member from the Chiefs of Ontario conduct the follow-up with each First Nation, since they have a pre-existing connection with these communities. In effect, participants may feel more comfortable in asking questions, discussing concerns, or requesting additional information, which in turn may lead to a more informed decision and desire to participate in the study.

CONCLUSION

Overall, this study aimed to evaluate, on a preliminary basis, the level and quality of vision care services available to First Nations elementary schools across Ontario. The primary statistic of interest was the number of children wearing glasses, since comparison to an expected norm is the easiest large-scale means of indirectly inferring the level of uncorrected refractive error at each school. In this study, which had an overall response rate of 43%, 25% of children attending First Nations elementary schools were wearing glasses, which is very close to the expected norm. The fly-in community cohort had the greatest percentage of children wearing glasses, while communities that did not have a visiting optometrist had the lowest percentage. However, these results are not consistent with those of comparable studies conducted at the level of individual First Nations communities, and thus care should be taken in interpreting the present findings. A social acceptability bias may account for an increased number of students reported to be wearing glasses in schools at which previous studies found that the percentage of glasses-wearing students was much lower than the expected value. Since this much lower value was consistent in three schools (see Appendices 1 and 2), this bias may have influenced several participant responses. Additionally, a selection bias is likely given the low attendance at some schools, such that a large number of children—presumably from economically or educationally depressed families— were not counted. Thus, an improved, more accountable means of survey distribution, in which surveys are mailed directly to First Nations leadership, may enhance the validity of a similar study.

RECOMMENDATIONS FOR IMPROVED VISION CARE SERVICES TO FIRST NATIONS ELEMENTARY SCHOOLS

1. Each First Nation elementary school should have an optometrist visit the school at the start of each school year to provide comprehensive eye exams and glasses to the student population.

2. Each child needing glasses should receive two pairs to achieve greater compliance with wearing glasses (see Appendix 1).

3. Teachers and school staff should be more involved in knowing which children in their care wear glasses so that they can encourage and support compliance with wearing glasses.

4. Each First Nation elementary school would benefit from creating a Children's Vision Committee comprised of two or three school staff members who could work to educate teachers and parents about children's vision and help identify students who need urgent vision care services.

ACKNOWLEDGEMENTS

The authors would like to thank the Canadian Association of Optometrists for providing an unrestricted educational grant in support of this project. They are also grateful to Ms. Donna Atkinson of the National Collaborating Centre for Aboriginal Health for her review of this paper, Ms. Bernadette deGonzaque of the Chiefs of Ontario Organization and Mr. Tony Jocko from the Union of Ontario Indians. ●

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Appendix 1

Uncorrected Refractive Error in First Nations Elementary Schools: A Two-School Study

Sagamok First Nation, with a population of 1,036, is located on the north shore of Lake Huron in Ontario between Sudbury and Sault Ste. Marie. The nearest optometrist is 40 km away in the town of Espanola. M'Chigeeng First Nation, with a population of 897, is located on Manitoulin Island and the nearest optometrist is 30 km away in the town of Little Current. Both communities have Band-operated elementary schools. There are 194 students at the Sagamok FN School and 128 at the M'Chigeeng FN School from Junior Kindergarten to Grade 8.

The Vision Institute of Canada provided full comprehensive pediatric vision and eye health exams with cycloplegia to a combined total of 250 students at these two schools in October 2012 (139 students - Sagamok FN) and October 2014 (111 students - M'Chigeeng FN.) The children at Sagamok FN each received one free pair of glasses, if prescribed; the children at M'Chigeeng FN each received two free pairs of glasses, if prescribed.

Findings:

1. This was the first eye exam for more than 55% of the children.
2. Only 11 of the 250 children (4.4%) were wearing glasses at the time of their eye examination.
3. Seventy-six of the 250 children (30%) had a correctable refractive error (i.e., glasses were needed to improve vision) and were prescribed glasses.
4. Only 11 of these 76 children (14%) were wearing glasses in school at the time of their examination (the same 11 students as in bullet point 2 above.)
5. Sixty-five of the 76 children (86%) who needed glasses were not wearing them or did not have them at the time of their examination.
6. These First Nations children had a higher prevalence of astigmatism than is found in non-Aboriginal children.
7. Greater compliance with wearing glasses after 6 months was observed in the M'Chigeeng FN School, where each child received two pairs of glasses.

APPENDIX 2

Summary of an interim report on a school vision screening program at Lac Seul First Nation, Ontario

September-October 2015

Lac Seul is an Ontario First Nations community that consists of three settlements: Frenchman's Head, Kejick Bay, and Whitefish Bay. The population as of October 2015 was roughly 860. In each settlement area there is a health clinic, however, the community had not been visited by an optometrist in over 2 years. The closest city with a hospital is Sioux Lookout, which is about a 30-minute drive from the community, and the nearest city with optometrists is Dryden, almost 2 hours away. In addition, many individuals do not own a car and therefore have no transportation. There is no community pooling of transportation.

A protocol to compare the results of a vision screening program to the results of comprehensive eye exams was developed by Dr. Daphne Maurer of McMaster University and Dr. Agnes Wong of SickKids Hospital. The screening program was administered to 65 children from Junior Kindergarten to Grade 1 who were attending the Band-operated elementary school. (The project team included Dr. Daphne Maurer and her assistants Mayu Nishimura and Sally Stafford. Dr. Brian Lockyer from Dryden was the attending optometrist.)

Vision screening involved 5 tests: monocular acuity with Cambridge Crowding Cards, stereo acuity with Preschool Randot, auto-refraction with a Spot auto-refractor, auto-refraction with a PlusOptix S12, and a check for misalignment with a Paediatric Vision Scanner, a new device that is based on visualizing the retinal blood vessels from laser interference patterns. Children were referred if they failed to achieve the expected value for their age on any single test or were unable to complete any of the five tests.

Of the 65 children who were screened, 58 failed one or more of the screening assessments and were referred to the optometrist with the research team for comprehensive eye exams. Due to time constraints and issues concerning consent forms, only 26 of the 58 referred children received comprehensive eye exams, and most had cycloplegia.

Of the 26 children examined, 16 required glasses (62%). This unusually high rate of referral from vision screening and the higher percentage of visual problems through comprehensive eye exams suggests that the baseline rates of eye problems may be much higher in this and other First Nations communities than in the general population. Every child who was prescribed glasses had astigmatism of 1.50D or more. Only 5 had significant hyperopia and none had myopia. None of the children who required glasses had been prescribed glasses previously. This was the first eye exam for the majority of the children.*

These results are consistent with other studies1 and suggest that "children at high risk of vision disorders such as children from remote indigenous populations... require separate assessment and diagnosis and that screening programs are not appropriate for these populations."

(* Unpublished data used with the permission of the research team.)

1) National Children's Vision Screening Project: Literature Review; Mathers M et al. Prepared for the Commonwealth of Australia as represented by the Department of Health and Ageing; July 2008

APPENDIX 3

VISION INSTITUTE

LaurentianUniversity
UniversitéLaurentienne

September 15, 2015.

Dear School Principal,

The **Vision Institute of Canada**, with the help and support of the **Chiefs of Ontario**, is conducting a survey of all Band-operated First Nations elementary schools in Ontario to determine the level and frequency of vision care services available to the students of the schools. During the months of October 2015 to January 2016, we would like to contact a representative of each of the 77 schools (representing approximately 8,000 elementary school students) to talk about various aspects of children's vision care services.

We hope that you will participate in this study. Regular comprehensive eye exams for school-age children are a crucial aspect of learning, as poor vision can dramatically affect reading and learning skills. The main goal of this study is to bring comprehensive vision and eye health care services directly to communities-in-need, to improve overall quality of life and learning for First Nations children. Access to eye exams and glasses is not easy for many families living in First Nations communities. The nearest optometrist is often many kilometers away. The Vision Institute of Canada believes that the best way to improve First Nations access to vision and eye health care services is for an optometrist to visit the community on a regular basis. This is the gold standard of care which we hope to promote to all communities.

The Vision Institute is collaborating with Dr. Nancy L. Young, Research Chair at Laurentian University, on this school vision care program. Two Laurentian University research students, Kayla Belanger and Lyndsay Greasley, will be following up with you or your school representative in approximately one week. Responding to this survey implies consent to participate in the research study, however it is important to note that you are free to decline involvement or withdraw from the study at any time by sending an email to visioncaresurvey@gmail.com. Confidentiality of survey responses will be protected as only primary investigators have access to the data collected. All survey responses are stored on an online survey database that is password-protected.

The survey can be accessed online at https://redcap.laurentian.ca/surveys/index.php?s=tvT2sC. A copy of the survey questions is also attached to this letter. This survey is straightforward and takes approximately 30 minutes to complete, either on paper, by phone or online. Kayla Belanger and Lyndsay Greasley can be reached at visioncaresurvey@gmail.com for any questions regarding the survey. Your support of this project is essential to its success. You are also free to contact me by phone or email if you have any question, concerns or suggestions that cannot be addressed by the Laurentian University research students.

The Research Ethics Board at Laurentian University has approved this project. Should you have any concerns, feel free to contact ethics@laurentian.ca.

The Vision Institute of Canada is a national non-profit charitable organization dedicated to the preservation, promotion and advancement of optimal vision and excellence in eye care through education, research and specialized clinical services. The Vision Institute was established in 1981 through the financial support of the Ontario Association of Optometrists, the College of Optometrists of Ontario and the University of Waterloo, School of Optometry and Vision Science.

Yours truly,

Dr. Paul Chris, OD
Executive Director

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The Vision Institute of Canada is a vision care charity providing specialized clinical services to underserved communities and at-risk patient populations.

APPENDIX 4

APPENDIX 4 - SCHOOL SURVEY QUESTIONS

1) What are the Grade levels in the elementary school?
A) JK – G8;
B) SK – G8;
C) JK – G4;
D) G5 – G8;
E) other

2) How many students attend the school?

3) How many students presently wear glasses? *(This will require an accurate count of the number of children actually wearing glasses in each grade level class done on the same day for consistency.)*
A) Total number of children wearing glasses ________
B) Total number of children not wearing glasses ________
NOTE: The total of A and B may be less than the number of students attending the school (Question 2) since there will be children absent on the day the "count" is taken.

4) Does an optometrist visit the school or community to provide eye exams and glasses?
A) Yes
B) No

5) If you answered Yes to question (4), how often does the optometrist visit?
A) Every six months;
B) Every year;
C) Every two years;
D) other

6) Is there any other form of vision assessment being provided to the children in the school? *(For example, is a simple screening test such as just reading an eye chart on a wall being done by a school nurse, teacher or community health worker?)*

7) Do children from your school see an optometrist outside the First Nation for eye exams?
A) Yes
B) No

8) If yes to question (7), who arranges the eye exams? *(For example, a school nurse, community health worker, teacher or parent; not the person's name)*

9) How far away (in km) is the nearest optometrist? *(This question is optional but useful if answered.)*

10) How are teachers/staff involved in identifying children in the classroom with vision problems?

11) How many children with vision problems are identified by school staff or community health worker and referred to an optometrist each year?

12) What are the main barriers to accessing an optometrist for children in your school?

13) OTHER COMMENTS:

Résultats d'une analyse du milieu visant à déterminer le niveau d'erreur de réfraction non corrigée chez les enfants des écoles primaires des Premières nations de l'Ontario

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RÉSUMÉ

Un sondage a été élaboré et utilisé pour déterminer le niveau et la qualité des services de soins de la vue offerts aux enfants des écoles primaires des Premières nations de l'Ontario et déterminer indirectement le niveau d'erreurs de réfraction non corrigées chez les enfants des Premières nations. Dans l'ensemble, les résultats du sondage ont révélé que 1 enfant sur 4 portait des lunettes. Les résultats du sondage indiquent que les collectivités éloignées qui reçoivent la visite d'un optométriste sont plus susceptibles d'avoir moins de cas d'erreurs de réfraction non corrigées que les collectivités non éloignées. Les résultats portent à croire que les examens oculaires complets effectués par des optométristes en visite dans la collectivité seraient le moyen le plus efficace d'améliorer la vision et l'état de santé oculaire des enfants des Premières nations.

Selon l'Enquête nationale auprès des ménages de 2011 de Statistique Canada, un peu plus de 300 000 Autochtones résident en Ontario, ce qui représente près de 22 % de la population autochtone totale du Canada et 2 % de la population totale de l'Ontario. De plus, il y a un peu plus de 200 000 membres des Premières nations en Ontario et ils représentent donc la majorité de la population autochtone de la province et près de 25 % de tous les membres des Premières nations au Canada. Parmi les membres des Premières nations ayant un statut d'Indien inscrit, 37 % vivent dans une réserve[1]. *Soixante pour cent (60 %) des enfants des Premières Nations vivant dans une réserve vivent dans la pauvreté, ce qui représente plus du triple du taux de pauvreté infantile au Canada, qui est de 18 %*[2].

Dr Dana Blakolmer examinant un jeune étudiant à l'école primaire de la Première Nation des M'Chigeeng.

Il existe une disparité si importante en matière de santé entre les peuples autochtones et la population globale au Canada qu'elle peut être considérée comme une épidémie nationale[3]. Il est bien établi que les Premières nations, les Métis et les Inuits connaissent des taux disproportionnés de maladies chroniques, de suicide, d'abus, de toxicomanie et de problèmes de santé mentale en comparaison de ceux qui sont observés dans la population générale[4,5]. Cela est souvent associé aux déterminants sociaux de la santé - tels que reconnus par l'Organisation mondiale de la Santé – notamment un statut socioéconomique plus faible, moins de possibilités d'emplois et d'éducation et un accès réduit aux biens et aux services de base tels que des aliments nutritifs et de l'eau propre[5,6]. De telles inégalités, conjuguées aux effets intergénérationnels du colonialisme, grâce à la *Loi sur les Indiens* de 1876 et au système des pensionnats, ont pour conséquence de créer de moins bons résultats en matière de santé[6].

Les troubles de la vue et les problèmes de santé oculaire sont un de ces résultats. Plusieurs études ont rapporté une prévalence plus élevée de l'astigmatisme chez les enfants autochtones américains et les enfants des Premières nations, en plus de problèmes d'acuité visuelle et de manque d'adhérence au port de lunettes plus importants[7, 8]. Les cas d'erreurs de réfraction non corrigées, définis pour les besoins de cette étude comme le pourcentage d'enfants qui ont besoin de lunettes, mais n'en ont pas ou ne les portent pas, sont un marqueur clé de la santé oculaire dans une collectivité. L'erreur de réfraction est importante parce qu'elle peut conduire à une déficience visuelle à long terme si elle n'est pas diagnostiquée et traitée rapidement[8], ce qui a pour résultat de perturber l'apprentissage chez les enfants et de compromettre la réussite scolaire.

Un projet de recherche pilote mené par l'auteur principal a permis de constater un taux très élevé d'erreurs de réfraction non corrigées dans une étude menée auprès des élèves des écoles primaires (de la prématernelle à la 8e année) dans deux écoles primaires des Premières nations de Sagamok et M'Chigeeng. Dans cette étude de deux écoles, 250 enfants ont subi des examens oculaires complets, ce qui a permis de calculer que l'incidence des erreurs de réfraction non corrigée était de 86 %. Seulement 4,4 % de tous les enfants examinés (11 sur 250) portaient des lunettes au moment de leur examen (voir l'annexe 1). Des études ont révélé qu'environ 25 % des enfants de la maternelle à la 8e année pourraient devoir porter des lunettes[8]. Comme les erreurs de réfraction non corrigées sont une cause évitable de déficience visuelle, l'élimination des risques évitables de cécité est une priorité dans l'initiative Vision 2020 de l'Organisation mondiale de la Santé.

Malgré cette évidente disparité en matière de santé, il n'y a pas d'études récentes sur la santé oculaire et la prévalence des troubles de la vision chez les Autochtones dans la littérature scientifique, en particulier les publications portant sur les enfants des Premières Nations. Cependant, il est essentiel de diagnostiquer et de corriger les problèmes de vision à un stade précoce chez les enfants, puisque l'intervention précoce réduit de façon significative le risque d'amblyopie et de perte de vision[9-12]. De plus, étant donné que les enfants autochtones sont décrits comme des apprenants visuels[13], et qu'une part importante de l'apprentissage de l'enfant est fondé sur la vision, l'erreur de réfraction non corrigée a des répercussions importantes sur la lecture, l'écriture et l'expérience éducative globale[9]. Beaucoup d'enfants pensent que leur mauvaise vue est normale et les parents, les soignants et les enseignants peuvent ne pas connaître les signes souvent subtils de la déficience visuelle, comme les maux de tête ou la fatigue oculaire, une capacité d'attention de courte durée ou le fait de perdre sa ligne lors de la lecture. Ainsi, l'accès tardif ou insuffisant aux soins de la vue pose un obstacle important à l'alphabétisation, à l'éducation et au développement social[8].

Cet écart reflète un besoin non satisfait et justifie l'évaluation de l'état actuel de la santé oculaire et des services de soins de la vue fournis aux enfants des Premières nations de l'Ontario, notamment leur accessibilité et l'utilisation d'examens de la vue complets en temps opportun. Toutefois, cela exige une exploration critique du profil culturel, économique et géographique unique de chaque Première nation, ainsi que des barrières qui en résultent, que ce soit au niveau individuel ou collectif.

Diverses études internationales ont montré que les enfants issus de familles à faible revenu et à faible niveau de scolarité sont plus susceptibles de souffrir de déficiences visuelles et moins susceptibles d'être diagnostiqués et traités pour des problèmes de vision[14-16]. Étant donné qu'une plus grande proportion d'enfants autochtones proviennent de milieux défavorisés par rapport à l'ensemble de la population, ils présentent donc un risque plus élevé de troubles de la vue non traités[14]. Un manque d'accès aux soins a également été signalé comme étant un facteur important qui affecte la santé de la vision chez les enfants et était précédemment considéré comme une des premières causes de l'erreur de réfraction non corrigée[15-17]. Il faut également tenir compte de la vaste géographie du Canada; beaucoup de membres des Premières nations vivent dans des collectivités rurales et nordiques où l'optométriste le plus proche se trouve souvent à des dizaines, voire à des centaines de kilomètres. Si l'on ajoute à cela l'absence de compensation pour les frais de déplacement (ou une compensation insuffisante), le problème d'accès à un véhicule et les conditions de voyage souvent dangereuses, les défis sont magnifiés. Ces réalités sont souvent sous-estimées.

Le dépistage des troubles de la vue par les agents de santé communautaires est une solution qui a été envisagée. Une récente étude menée en 2015 à la Première Nation de Lac Seul par des chercheurs de l'Hôpital pour enfants malades et de l'Université McMaster a démontré que même un programme de dépistage des troubles de la vue bien conçu ne convenait pas aux enfants qui fréquentent l'école dans une collectivité éloignée des Premières nations et que des examens de la vue complets doivent être la norme d'excellence des soins (voir l'annexe 2). Un examen de la vue complet comprend une évaluation des antécédents oculaires et médicaux, de l'acuité visuelle, de la coordination des yeux, de la réfraction et de la santé oculaire. Cette évaluation approfondie devrait assurer l'identification de tout problème oculaire.

La meilleure solution consiste à établir des partenariats entre les optométristes et les Premières nations, ce qui, selon nous, devrait être la norme de référence en raison de leur situation géographique unique. Cependant, compte tenu des ressources humaines et du financement gouvernemental limités, il est impératif de fournir des données probantes à l'appui de l'attribution d'optométristes aux collectivités. Pour répondre aux besoins de la population de la façon la plus efficace, nous devons d'abord déterminer quelles sont les collectivités où les besoins sont les plus pressants et ensuite allouer les ressources en conséquence.

Cette étude visait (A) à faire une estimation du besoin de services basée sur les niveaux d'erreur de réfraction corrigée en comparaison avec les normes attendues, et (B) à déterminer le niveau et la fréquence des services de soins de la vue offerts aux enfants de la prématernelle à la 8e année qui fréquentent des écoles élémentaires des Premières nations administrées par la bande en Ontario. Tous ces renseignements peuvent guider l'attribution de services aux Premières nations.

MÉTHODOLOGIE

Approbation du comité d'éthique

Le protocole de l'étude a été examiné par les représentants de l'Organisation des Chefs de l'Ontario et de l'Institut de la vision du Canada. Il a également été examiné et approuvé par le Comité d'éthique de la recherche de l'Université Laurentienne le 9 octobre 2015.

Participants

Un sondage a été élaboré et mis en œuvre en collaboration avec les Chiefs of Ontario, le Vision Institute of Canada et l'Université Laurentienne. Le questionnaire du sondage comprenait 13 questions portant sur les services de soins oculaires offerts aux enfants des Premières nations de l'Ontario qui fréquentaient des écoles primaires administrées par la bande. Chacune des 77 écoles primaires des Premières nations de l'Ontario (de la maternelle à la 8e année) a été invitée à y participer, ce qui représente environ 9 500 enfants. Les écoles qui offraient également les études secondaires n'ont pas inclut les données démographiques pour les élèves de la 9e à la 12e année.

Procédure

Les Chiefs of Ontario ont envoyé la page d'information de l'étude (voir l'annexe 3) et le questionnaire du sondage (voir l'annexe 4) aux représentants des conseils scolaires de chaque école administrée par la bande par courrier électronique le 26 octobre 2015. L'appui des représentants des conseils scolaires était nécessaire pour envoyer le lien vers le questionnaire en ligne du sondage au directeur de l'école. Cette mesure était nécessaire étant donné l'incohérence des renseignements sur les courriels des personnes-ressources dans la base de données des Chiefs of Ontario.

Les participants disposaient de deux options pour remplir le sondage. La première consistait à imprimer le questionnaire du sondage joint au courriel et à le remplir à la main, puis à l'envoyer par télécopieur au numéro du Vision Institute of Canada qui figurait sur la page d'information de l'étude. Il était aussi possible de remplir une version en ligne via REDCap, une base de données en ligne sécurisée accessible par un lien sur la page d'information[18]. Comme expliqué dans la page d'information, la soumission du questionnaire rempli était considérée comme un consentement implicite.

Le sondage exigeait qu'un représentant de chaque école, comme le représentant du conseil scolaire, le directeur de l'école, l'enseignant ou l'infirmière, se rende dans chaque salle de classe et compte le nombre d'enfants qui portaient des lunettes et le nombre d'enfants qui ne portaient pas de lunettes le jour du compte (les nombres comptés n'étaient pas nécessairement représentatifs du nombre réel d'élèves). Le reste du questionnaire pouvait être rempli indépendamment de la collecte de données et portait sur l'information concernant le type et la fréquence des services de soins de la vue fournis à la collectivité et le rôle de l'école dans l'identification des enfants ayant besoin d'une évaluation de la vue.

Suite à la distribution du sondage, deux assistantes étudiantes de l'Université Laurentienne ont fait un suivi et téléphoné à chaque directeur d'école pour s'assurer que le représentant du conseil scolaire de l'école leur avait fait parvenir les documents du sondage. Au cours de ces appels téléphoniques de suivi, certains directeurs d'école ont fourni une adresse électronique pour que le questionnaire leur soit envoyé directement, car ils n'avaient pas encore reçu une copie de leur représentant du conseil scolaire. S'il n'avait pas été possible de communiquer avec le directeur d'école après au moins 3 tentatives avant le 22 décembre 2015, l'école était placée sur une liste d'envoi pour que le questionnaire soit envoyé directement à l'école par le Vision Institute of Canada. Cette étape a été entreprise pour s'assurer que chaque école avait eu la possibilité de participer en raison du nombre d'écoles qui ont signalé que leur représentant du conseil scolaire ne leur avait pas fait parvenir le questionnaire du sondage.

Analyse des données

La collecte des données a officiellement pris fin le 12 février 2016, après quoi le sondage a été mis hors ligne. Le pourcentage d'enfants qui portaient des lunettes a été obtenu en divisant le nombre d'enfants qui portaient des lunettes par le nombre total d'enfants dans l'école le jour où le dénombrement a été effectué (c'est-à-dire la somme du nombre d'enfants portant des lunettes et n'en portant pas). En fonction des présences lors de cette journée précise, ce nombre peut être égal ou non au total de l'effectif scolaire. Des études antérieures ont révélé qu'environ 25 % des enfants de la prématernelle à la 8e année sont susceptibles de porter des lunettes[8]. En comparant le pourcentage rapporté de chaque école avec cette valeur attendue, nous pouvons déterminer, de façon très élémentaire, les besoins en matière de soins en optométrie dans la collectivité.

En plus du groupe global, les données étaient également organisées en quatre catégories principales : si l'école avait un optométriste visiteur, si l'école avait une autre forme d'évaluation de la vision (par exemple, le dépistage dans les réserves par une infirmière praticienne, une infirmière d'école, un enseignant, etc.), si les élèves ont vu un optométriste à l'extérieur de la réserve et si l'école était située dans une collectivité isolée.

Présentation des données

Un rapport d'une page qui résume les conclusions de cette étude a été donné à toutes les écoles primaires administrées par la bande en Ontario. Les rapports, propres à chaque collectivité, indiquaient où se trouvaient les optométristes les plus proches, le taux d'erreur de réfraction non corrigée à l'école et les résultats individuels de l'école en comparaison avec les autres écoles qui avaient participé à l'étude et les normes prévues. Deux types de rapports ont été employés, l'un dans un format écrit et l'autre avec des infographies et des éléments visuels supplémentaires pour rendre les données disponibles d'une manière culturellement appropriée.

RÉSULTATS

Description des répondants

Au total, 33 des 77 écoles primaires des Premières nations (43 %) ont répondu au sondage, 19 par télécopieur et 14 en ligne via REDCap (figure et tableau 1).

Tableau 1 : *Taux de réponse des collectivités é loignées et des collectivités non éloignées*

		Nombre de collectivités	Nombre de répondants	Taux de réponse
Éloignée	Oui	32	12	37,5 %
	Non	45	21	46,7 %
Total		77	33	42,9 %

Sur les 33 questionnaires remplis, seules quatre écoles ont complété le sondage de façon indépendante, sans aucun contact de la part de l'université Laurentienne.

Sur les 73 écoles contactées par l'Université Laurentienne, 24 ont complété le sondage, 5 ont refusé l'invitation et 44 n'ont pas répondu.

Sur les 24 écoles qui ont rempli le questionnaire du sondage, 17 ont répondu à l'invitation après un seul courriel, quatre ont répondu après avoir reçu un courriel de suivi et trois ont dû recevoir trois courriels.

Sur les 44 écoles qui n'ont pas répondu au sondage, celles qui ont fourni leur adresse de courriel ont reçu jusqu'à trois courriels de rappel au sujet de l'état d'achèvement du sondage. Après ces trois courriels de suivi, ces écoles n'ont pas été contactées à nouveau.

Le Vision Institute of Canada a envoyé des copies imprimées de la lettre d'information et du questionnaire du sondage aux 18 écoles qu'il a été impossible de joindre par téléphone ou par courriel. Cinq de ces 18 écoles ont répondu par la suite.

Les réponses au sondage ont révélé qu'environ 25 % des élèves portaient des lunettes (tableau 2). Cela suggère que, dans l'ensemble, il y a très peu de cas d'erreur de réfraction non corrigée. Toutefois, en raison de l'importance de la situation géographique sur l'accès aux services, nous avons comparé les taux de correction de la vision dans les collectivités éloignées à ceux des collectivités accessibles par la route. Les résultats sont présentés au tableau 3, qui compare également les taux dans les collectivités qui ont un optométriste visiteur à ceux d'autres collectivités.

DISCUSSION

Le tableau 1 montre que 32 écoles élémentaires des Premières nations de l'Ontario sont situées dans des collectivités éloignées et que les 45 autres sont situées dans des collectivités rurales, urbaines ou périurbaines. Les collectivités qui sont reliées uniquement par transport aérien et celles qui ne sont accessibles que par les routes de l'air ou de glace étaient considérées comme éloignées. Sur les 32 écoles des collectivités éloignées, 12 (37,5 %) ont répondu au sondage. Sur les 45 écoles des collectivités non éloignées, 21 (46,7 %) ont répondu au sondage. Ces données portent à croire que les élèves vivant dans une collectivité éloignée des Premières nations pourraient avoir un meilleur accès aux services de soins de la vue. Le taux de réponse moins élevé observé pour les collectivités éloignées peut indiquer que l'incitation à répondre au sondage était moins forte que dans le cas des collectivités non éloignées. Cela peut être attribuable au fait que l'affectation de fonds aux Premières nations est influencée par des facteurs géographiques comme la distance du centre de service le plus proche et que, par conséquent, les collectivités isolées reçoivent plus d'attention que les collectivités non isolées[19]. Cependant, il arrive que les collectivités non éloignées des Premières nations se trouvent à plusieurs kilomètres d'un centre de service dispensant des soins complets de la vue. Les collectivités non éloignées ont indiqué que l'emplacement et les frais de déplacement étaient les principaux obstacles à l'obtention de services de soins de la vue complets. La distance moyenne entre les 33 communautés qui ont participé au sondage et l'optométriste le plus proche était de 196 km.

Figure 1 : *Taux de réponse au sondage*

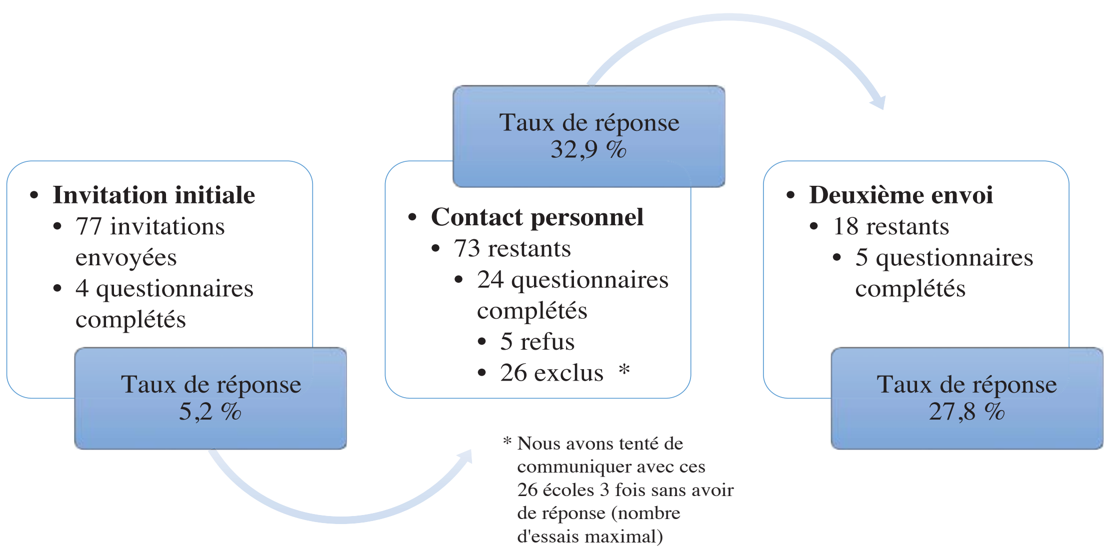

Tableau 2 : *Pourcentage des enfants qui portent des lunettes dans chacune des écoles primaires*

Communauté des Premières nations (O) indique qu'un optométriste visite la communauté		Nombre d'élèves	Nombre avec des lunettes	Nombre sans lunettes	Pourcentage portant des lunettes (%)
Première nation d'Aamjiwnaang		11	0	11	0
Première nation d'Aroland		91	21	53	28
Première nation Chippewas de Georgina Island		15	2	13	13
Première nation Chippewas de Nawash	(O)	71	14	53	21
Première nation Chippewas de Rama		160	16	130	11
Première nation de Curve Lake		53	9	44	17
Première nation de Deer Lake	(O)	256	88	168	34
Première nation d'Eagle Lake		27	3	24	11
Première nation de Fort Albany	(O)	194	44	30	59 (?)*
Première nation de Fort Severn	(O)	85	33	50	40
Première nation de Grassy Narrows		187	30	157	16
Première nation de Keewaywin	(O)	103	8	95	8
Première nation de Long Lake nº 58		97	4	7	37 (?)
Première nation Mattagami		31	10	21	32
Première nation des Mississaugas de New Credit		126	20	105	16
Première nation des Mohawks d'Akwesasne	(O)	297	52	189	22
Première nation crie de Moose		36	17	19	47
Première nation de Neskantaga	(O)	49	12	37	24
Première nation de Nibinamik	(O)	84	8	52	13
Première nation de North Caribou Lake	(O)	148	18	130	11
Première nation de North Spirit Lake	(O)	78	26	52	33
Première nation Northwest Angle nº 37		6	3	3	50
Première nation des Ojibways d'Onigaming		46	16	30	35
Première nation de Pikangikum	(O)	750	250	400	38 (?)
Première nation de Sagamok		178	21	158	12
Première nation Shawanaga		23	5	18	22
Première nation de Sheshegwaning		10	2	8	20
Première nation de Shoal Lake nº 40		33	7	26	21
Première nation Temagami		33	7	24	23
Première nation Wabaseemoong		300	52	200	21
Première nation de Wabigoon Lake		12	3	9	25
Première nation Webequie	(O)	144	18	126	13
Première nation de Weenusk		28	7	21	25
TOTAL		3762	826	2463	Moy = 25,3 %

*NOTA : (?) Indique des données qui peuvent refléter des rapports inexacts mais qui sont incluses dans les résultats finaux.

Tableau 3 : *Pourcentage d'élèves qui portent des lunettes selon des groupes précis*

	Pourcentage d'élèves portant des lunettes	Pourcentage d'élèves comptés (par rapport à l'effectif total)
La collectivité est-elle accessible uniquement par avion (non accessible par route pendant toute l'année)?		
Oui Non	34% 20%	86,4 % 86,7 %
Les familles visitent-elles un optométriste à l'extérieur de la collectivité?		
Oui Non	29% 24%	87,1 % 84,4 %
Y a-t-il d'autres types d'évaluations de la vision?		
Oui Non	25% 25%	78,9 % 90,7 %
Est-ce qu'un optométriste visite la collectivité?		
Oui Non	29% 19%	86,5 % 91,8 %

Notre objectif principal était de comparer les taux de correction de la vue aux normes attendues, ce qui pourrait laisser entrevoir un besoin de services. Les résultats regroupés présentés au tableau 2 indiquent que le pourcentage d'enfants portant des lunettes dans l'ensemble des 33 écoles ayant répondu était de 25,3 %, ce qui est très semblable au taux normal prévu dans la population générale[8]. Toutefois, d'après les résultats des deux écoles mentionnées dans l'introduction, cette valeur devrait être considérablement plus faible (environ 4,4 %). Puisque cette étude a utilisé des données autodéclarées pour recueillir de l'information, certaines formes de biais peuvent expliquer pourquoi ce résultat n'est pas vraiment représentatif de la population. Par exemple, les données ont été fournies par les représentants de l'école, ce qui augmente le risque d'un biais d'acceptabilité sociale. Il est possible que les répondants au sondage aient fourni, de façon non intentionnelle, des données qui dépeignent leur école élémentaire ou la collectivité des Premières nations de façon plus favorable. Ajoutons que les représentants de l'école ayant également été choisis par le directeur de l'école et ayant peut-être reçu leurs directives de deuxième ou de troisième main , ils n'avaient peut-être pas une compréhension concrète du but de l'étude ou de l'importance d'une collecte précise des données. Cela peut avoir affecté la validité globale de l'étude et les résultats peuvent ne pas être généralisables à l'ensemble de la population.

Lorsque nous avons exploré les taux de correction de la vue à travers les collectivités, nous avons reconnu que certaines régions avaient un plus grand besoin de services, basé sur un pourcentage plus faible d'élèves portant des verres correcteurs. Selon les résultats du tableau 3, 34 % des élèves qui fréquentaient une école élémentaire située dans une collectivité isolée ou accessible seulement par transport aérien portaient des lunettes, ce qui est supérieur à la valeur moyenne prévue de 25 %[8]. D'autre part, 20 % des élèves qui fréquentaient une école non isolée administrée par la bande portaient des lunettes, ce qui est inférieur à la moyenne prévue. Ces résultats suggèrent que les collectivités des Premières nations qui ne sont accessibles que par la voie des airs (ou isolées) sont plus susceptibles de recevoir suffisamment de services de soins de la vue que les collectivités non éloignées. Les données du tableau 3 portent également à croire que le pourcentage d'élèves qui portent des lunettes est plus élevé dans les collectivités des Premières nations dont les habitants sont en mesure de visiter un optométriste à l'extérieur de la collectivité que dans celles qui n'ont pas cette possibilité. Cependant, dans les familles qui ne visitent pas un optométriste, 24 % des enfants portent des lunettes, ce qui est encore très proche de la moyenne attendue.

Dans l'ensemble, 25 % des élèves portaient des lunettes, indépendamment de toute autre forme d'évaluation de la vue (par exemple, un simple test de dépistage effectué par un enseignant ou une infirmière d'école), ce qui est conforme à la norme attendue. Enfin, le pourcentage d'élèves qui portaient des lunettes (29 %) dans les collectivités qui ont un optométriste visiteur était supérieur au pourcentage d'élèves qui portaient des lunettes (19 %) dans les collectivités qui n'avaient pas accès à un optométriste visiteur. Cela porte à croire que le modèle de l'optométriste visiteur est très efficace.

Le tableau 3 montre que, de façon générale, les pourcentages d'enfants portant des lunettes sont relativement élevés dans chaque catégorie. Cependant, aucun des groupes ne représente 100 % de la population des élèves. Les échantillons des 33 écoles (représentant 43 % de la population cible) ne représentaient pas l'ensemble des élèves qui fréquentaient chaque école. Bon nombre des écoles participantes avaient des taux d'absence élevés le jour où les données ont été recueillies. Il est intéressant de spéculer que les enfants en bonne santé fréquentent la classe régulièrement et sont donc plus susceptibles d'avoir été inclus dans cette étude. Cela augmenterait le pourcentage global d'enfants portant des lunettes et conduit à un biais de sélection. L'échantillon statistique utilisé pour l'analyse (population d'élèves en bonne santé) n'a pas été correctement randomisé et n'est donc pas représentatif de l'ensemble de la population. De plus, les 33 écoles examinées dans cette étude (3 762 élèves au total) représentaient moins de 39 % de la population totale des élèves des 77 écoles primaires des Premières nations en Ontario (9 698).

LIMITES

Cette étude a été difficile à mener et nous reconnaissons que diverses limites méthodologiques doivent être prises en compte lors de l'interprétation des résultats.

Premièrement, les écoles ont été contactées indirectement, par l'entremise de deux organismes tiers, comme la lettre d'invitation a été envoyée par les Chiefs of Ontario et le suivi a été fourni par l'Université Laurentienne. Cette approche indirecte reposait sur notre partenariat avec les Chiefs of Ontario et nous nous sommes efforcés de faire en sorte que nos recherches soient pertinentes et respectueuses, mais elle a peut-être causé une certaine confusion chez les répondants. En outre, les invitations ont d'abord été envoyées aux représentants des conseils scolaires, qui ont ensuite transmis le matériel aux directeurs d'école respectifs. Cette méthode indirecte peut avoir eu comme résultat que certains participants potentiels n'ont pas reçu le questionnaire. Cette préoccupation a été confirmée par plusieurs écoles qui ont déclaré n'avoir jamais reçu le questionnaire, ce qui a probablement contribué à la petite taille de notre échantillon.

Deuxièmement, il était difficile de communiquer avec le directeur ou un représentant approprié par téléphone. Beaucoup voyagent ou sont très occupés avec les programmes scolaires. De plus, de nombreux secrétaires d'école n'étaient pas familiers avec l'étude et certains se sentaient mal à l'aise de fournir une adresse de courriel. Il y avait donc de nombreux obstacles à la réception du questionnaire du sondage.

Ces limites reflètent certaines des réalités de la réalisation de recherches auprès des Premières nations. En dépit de ces limites, nous croyons que nos résultats sont importants parce qu'ils représentent une avancée significative dans le niveau d'information disponible à ce jour et démontrent qu'il existe un besoin au niveau des collectivités, ce qui pourrait guider l'allocation de ressources limitées.

Dr Catherine Chiarelli a offert un examen oculaire complet à un jeune étudiant de la Première Nation de Sagamok.

RECOMMANDATIONS POUR LES ACTIVITÉS FUTURES DE RECHERCHE

Plusieurs pistes d'amélioration se dégagent de nos travaux. Une copie du questionnaire et de la lettre d'information doit être envoyée directement aux directeurs d'école. Bien que le suivi par téléphone prenne du temps, il est important, puisque cette méthode a atteint un taux de réponse de 32,9 %. L'envoi d'un deuxième courriel est également important et a permis d'atteindre un taux de réponse de 27,7 % parmi les écoles qui n'avaient pas répondu à d'autres approches.

En outre, les dirigeants de la collectivité devraient être informés des objectifs de l'étude et des procédures à l'avance. Cela pourrait améliorer la participation ou du moins encourager une évaluation de l'adéquation des services de soins de la vue disponibles dans la collectivité. En outre, certains directeurs d'école n'étaient peut-être pas à l'aise de prendre la décision de participer au projet de recherche sans en avoir tout d'abord parlé au conseil de bande et demandé son approbation.

Il peut également être avantageux qu'un membre du personnel des Chiefs of Ontario effectue le suivi auprès de chaque Première nation, puisqu'ils ont déjà un lien avec ces collectivités. En procédant de cette façon, les participants pourraient se sentir plus à l'aise pour poser des questions, discuter de leurs préoccupations ou demander des renseignements supplémentaires, ce qui pourrait conduire à une décision plus éclairée et au désir de participer à l'étude.

CONCLUSIONS

Dans l'ensemble, cette étude visait à évaluer, à titre préliminaire, le niveau et la qualité des services de soins de la vue offerts aux écoles primaires des Premières nations de l'Ontario. La principale statistique d'intérêt était le nombre d'enfants portant des lunettes, puisque la comparaison avec une norme attendue est le moyen le plus facile à grande échelle d'inférer indirectement le niveau d'erreur de réfraction non corrigée dans chaque école. Dans cette étude, qui avait un taux de réponse global de 43 %, 25 % des enfants fréquentant les écoles primaires des Premières nations portaient des lunettes, ce qui est très proche de la norme attendue. La cohorte des collectivités qui ne sont accessibles que par transport aérien avait le pourcentage d'enfants portant des lunettes le plus élevé, tandis que les collectivités qui n'avaient pas d'optométriste visiteur avaient le pourcentage le plus faible. Cependant, ces résultats ne sont pas conformes à ceux d'études comparables menées sur une base individuelle au niveau des collectivités des Premières nations, et il faut donc veiller à interpréter les présents résultats avec prudence. Un biais d'acceptabilité sociale peut expliquer le nombre plus élevé d'élèves qui portent des lunettes dans les écoles où des études antérieures ont montré que le pourcentage d'élèves portant des lunettes était beaucoup plus bas que la valeur prévue. Étant donné que cette valeur est beaucoup plus faible dans trois écoles (voir les annexes 1 et 2), ce biais peut avoir influencé plusieurs réponses des participants. De plus, un biais de sélection est probablement attribuable à la faible fréquentation de certaines écoles, de sorte qu'un grand nombre d'enfants - sans doute issus de familles défavorisées sur le plan économique ou faiblement scolarisées- n'ont pas été comptés. Par conséquent, un mode de distribution des questionnaires de sondage amélioré et plus responsable, dans lequel ils sont envoyés directement aux dirigeants des Premières nations, pourrait permettre d'améliorer la validité de ce type d'étude.

RECOMMANDATIONS POUR AMÉLIORER LES SERVICES DE SOINS DE LA VUE OFFERTS AUX ÉCOLES PRIMAIRES DES PREMIÈRES NATIONS

1. Chaque école primaire des collectivités des Premières nations doit recevoir la visite d'un optométriste au début de chaque année scolaire afin de fournir des examens de la vue complets et des lunettes à la population étudiante.

2. Chaque enfant qui a besoin de lunettes doit en recevoir deux paires pour mieux se conformer au port de lunettes (voir l'annexe 1).

3. Les enseignants et le personnel de l'école devraient être plus impliqués et savoir quels sont les enfants qui portent des lunettes afin d'encourager et de soutenir la conformité avec le port de lunettes.

4. Chaque école primaire des Premières nations profiterait de la création d'un comité de la vue des enfants composé de deux ou trois membres du personnel de l'école qui pourraient travailler pour éduquer les enseignants et les parents sur la vue des enfants et aider à identifier les élèves qui ont besoin de soins urgents.

REMERCIEMENTS

Les auteurs tiennent à remercier l'Association canadienne des optométristes d'avoir offert une subvention éducative sans restriction à l'appui de ce projet. Ils sont également reconnaissants à Mme Donna Atkinson du Centre de collaboration nationale pour la santé autochtone pour la relecture de ce document, Mme Bernadette deGonzaque, de l'Organisation des Chiefs of Ontario, et M. Tony Jocko, de l'Union des Indiens de l'Ontario.

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Les annexes 1-4 peuvent être consultées en ligne à www.opto.ca

Ocular Hypertension: A Review And Evidence-Based Roadmap

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Abstract

Increased intraocular pressure is arguably the most important, and currently the only modifiable, risk factor for glaucomatous optic neuropathy. Ocular hypertension is often encountered by clinicians in daily practice and is expected to be seen with increasing frequency as the population ages. Awareness and understanding of the extensive research performed on this subject, with particular focus on the work of the Ocular Hypertension Study Group, are critical for comprehensively assessing the risk of conversion to glaucoma. Although management decisions can be complex, they can be aptly handled by the well-informed optometrist in consultation with their patients.

KEY WORDS:
ocular hypertension (OH), primary open angle glaucoma (POAG), central corneal thickness (CCT), ocular hypertension study (OHTS), number needed to treat (NNT), decision-support tools, threshold to treat

The primary goals of the optometrist are to prevent disease and to maintain and maximize visual health and function. Glaucomatous optic neuropathy is the leading cause of irreversible blindness worldwide; the current global prevalence of glaucoma in persons between 40 and 80 years of age is 3.54%, or approximately 64.3 million individuals.[1] As the population continues to simultaneously increase and age, this number is expected to increase to 76.0 million by 2020 and to a staggering 111.8 million by 2040.[1] Specifically in Canada, it was estimated that 409,000 people had glaucoma in 2002-2003.[2] The National Coalition for Vision Health has predicted a 105% increase in the number of Canadians who will be rendered blind as a result of glaucoma, from 9,500 cases in 2006 to 19,400 cases by 2031.[2] This disease imposes a substantial burden on both the individual and society as a whole, but it can be combated by the application of optometry. Although our understanding of glaucomatous optic neuropathy continues to expand, increased intraocular pressure (IOP) remains the most important modifiable risk factor for this optic neuropathy.[3] As a result, substantial energy has been devoted to research on ocular hypertension (OH). Historically, OH was considered to be synonymous with glaucoma, or a patient was automatically considered to be in a "glaucoma suspect" category.[4,5] At present, OH is defined as an IOP greater than 2 standard deviations from the mean of a normal adult population, with "normal" visual fields and a "normal" optic disc structure.6 According to Armaly, "normal" IOP, based on Goldmann applanation tonometry (GAT), is expected to be 16 ± 2.5 mmHg.[7] According to this distribution, approximately 95% of the population would be expected to have an IOP under 21 mmHg and 98% would have an IOP under 24 mmHg. However, these are statistical averages based on the presumption of a symmetrical Gaussian distribution. In actuality, studies have shown that IOP in a population is not distributed symmetrically, but rather is skewed toward higher pressure.[8-11] The fact that the distribution curve is skewed cannot be regarded as evidence that eyes with IOP above a statistical normal have a pathological process.[12] Accordingly, there is some uncertainty regarding the influence of statistically high IOP in individual patients. It is critical that the optometric community have a strong understanding of the prevailing evidence on OH to reduce this uncertainty.

EPIDEMIOLOGY OF OH

Fortunately, most patients with OH do not develop glaucoma. An analysis of multiple studies shows that the 5-year incidence of primary open-angle glaucoma (POAG) in untreated ocular hypertensive cases ranges from 9.5 to 22%.[13] In contrast, the 5-year incidence of POAG in treated ocular hypertensive patients ranges from 4.4 to 15%, which represents a substantial reduction over that in untreated patients. Although this analysis suggests that the overall incidence of glaucoma development is low, the visual and functional consequences in patients who actually develop glaucoma can be devastating. When deciding upon whether or not to treat, it is helpful to understand the prevalence of OH in various populations, and thus the potential impact of therapeutic intervention. General estimates of the overall prevalence of ocular hypertension have been reported to range from 4 to 7% of the US population over age 40, and this prevalence increases with age.[14] Thus, an estimated 4.8 to 9.5 million people in the US have elevated IOP without detectable glaucomatous damage using current clinical tests.[15] The variation in prevalence can be even greater when specific populations are examined. For example, the prevalence of ocular hypertension ranged from 2.3% in patients 43–49 years of age to 7.7% in those 75–79 years of age in the widely cited Beaver Dam Study, which included a primarily Caucasian population in Wisconsin, USA.[16] In a study with similar demographics, the Blue Mountain Eye Study, which included an older Australian community of largely white subjects of northern European descent, the age–standardized prevalence of OH was 5.15% in patients aged 50 and older in the year 2000.[17] The authors projected that the prevalence in this population would reach 5.48% in the year 2030.[18] In the Los Angeles Latino Eye Study, in Latinos from California, the 4-year incidence of OH, defined as IOP >21 mmHg and the absence of optic disc damage or abnormal visual field results, was 3.6%, after adjusting for the age distribution.[19] The Chennai Eye Disease Incidence Study, in a population of Southern Indians aged 40 and older, found that the 6-year incidence of ocular hypertension, defined as IOP above the 97.5th percentile of the population with no evidence of glaucoma, was 2.17%.[20] Thus, the epidemiology of OH varies widely among different specific populations and the impact of treatment may be greater in some communities than others.

OH HISTORICAL PERSPECTIVE

The general opinion in 1862, dating back to Donders, was that ocular hypertension nearly always progressed with increasingly higher IOPs, and was synonymous with glaucoma.[4] This viewpoint persisted into the late 1950s. By the 1960s, it had become increasingly obvious that the observed prevalence of glaucoma, defined by the stricter criteria of raised pressure, cupped disc, and field loss, was too low to support the hypothesis that pressures beyond the higher end of the Gaussian distribution inevitably led to glaucoma.[21] Although this observation was innovative, it was still not clear whether IOP in patients with OH would continue to rise over time or how often ocular hypertension was a precursor of manifest glaucoma. A 1964 study by Linner and Stromberg on untreated ocular hypertensives determined that IOP in these patients did not tend to rise over time or show signs of glaucoma.[4] In 1968, Graham reported a follow-up study of 232 ocular hypertensives over 43 months, and only 1 patient developed a field defect.[22] In 1969, in a 10-year study on subjects at all levels of tension, Armaly found that patients with initial applanation readings >23 mmHg had a very low incidence of visual field loss, although there was, not surprisingly, a tendency for field defects to be more prevalent at higher pressures.[23] Multiple small retrospective studies on OH were performed over the next few decades.[24-32] The results of these studies were inconclusive; some demonstrated that treatment was effective and others demonstrated that treatment was not effective for slowing the conversion to glaucoma. Problematically, these studies had no consistent definition of glaucoma, were limited by poorly efficacious medications, and used varying end points. As a result of the conflicting methods, definitions, and findings, these studies prevented the attainment of a consensus that would be useful to clinicians in their treatment decisions. Furthermore, it was unclear whether the benefits of treatment outweighed the risks associated with treatment.[33] In an effort to finally achieve a consensus on the management of these patients, the landmark Ocular Hypertension Treatment Study (OHTS) was initiated in 1994.

OCULAR HYPERTENSION TREATMENT STUDY

Specifically, OHTS sought to evaluate the safety and efficacy of topical ocular hypotensive medication in preventing or delaying the onset of visual field loss and/or optic nerve damage in subjects with ocular hypertension who were at moderate risk for developing primary open angle glaucoma.[34] OHTS was a multicenter; convenience randomized controlled trial (RCT) involving 1,636 ocular hypertensive patients who were at moderate risk for developing glaucoma. Demographically, 69% of the participants were Caucasian, 25% were African-American and 3.6% were of Hispanic origin. Strict eligibility criteria were required for participation. Patients were randomized to a treatment group or a close observation group. The goal in the treatment group was to achieve an IOP reduction of 20% or more from baseline and to reach an IOP level under 24 mmHg. The study was split into two phases. Phase I had a mean duration of 72 months. At 60 months, the cumulative probability of developing clinically detectable glaucoma, defined as reproducible visual field abnormalities or reproducible clinically significant optic disc deterioration attributable to glaucoma, was 4.4% in the medication group and 9.5% in the observation group.[33] Based on the greater than 50% relative risk reduction and the absolute risk reduction of 5.1% in the treatment group, the authors concluded that the use of medications was clearly effective in delaying or preventing the onset of POAG in individuals with OH. These results, however, failed to answer many critical questions that could assist the clinician in decision-making when assessing these patients.

Phase II of OHTS aspired to determine whether all patients should be treated, when they should be treated, and specifically whether there was a penalty to delaying treatment. All participants from phase I were invited to participate in phase II, and 1,366 patients continued in the study. Ocular hypotensive therapy was started in the original observation group, and the original treatment group continued their medications. Phase II lasted for a mean of 5.5 years and included 1,159 active patients at the study's 13-year end point.[15] This created a delayed treatment group to compare to the so-called early treatment group. After 13 years, the overall percentage of patients who were initially randomized to the observation group that developed POAG was 22%, compared with 16% in the original treatment group, which means that treatment was associated with a 27% relative reduction in the incidence of POAG.[15] Glaucoma was detected at a median of 6.0 years in the observation group and 8.7 years in the treatment group.[15] These overall 13-year outcomes further validated phase I, and reinforced the value of treatment in delaying or preventing glaucoma. In addressing whether there was a penalty to delaying treatment, the authors concluded that there was only a modest overall penalty. This was rooted in the fact that the 13-year incidence of POAG decreased substantially in patients from the observation group once medication was initiated in phase II. The cumulative proportion of participants who developed POAG in phase II was 11% in the original observation group and 12% in the original medication group, which was an incremental difference. They suggested that this result indicates that there is no acceleration of damage if treatment is initially withheld, since the frequency of developing the disease clearly did not increase once treatment was initiated. However, they did note that there was a greater disease burden on the original observation group, with more eyes reaching the end points regarding both glaucomatous optic disc and visual field (8% observation vs 5% treatment), the development of bilateral glaucoma (6% observation vs 4% treatment), and a significantly worse pattern standard deviation (PSD) slope.[15]

A more detailed analysis established risk subgroups that were divided into tertiles of low, moderate and high risk. These subgroups had baseline predicted 5-year risks of developing POAG of ≤6%, between 6 and 13%, and ≥13%, respectively.[35] The 13-year results showed that the incidence of POAG in the lowest-risk subgroup was 8% in the observation group and 7% in the treatment group, which reflects a simplified relative risk reduction (RRR) of approximately 12.5% and an absolute risk reduction (ARR) of 1%. In the moderate-risk subgroup, 19% of patients in the original observation group developed POAG versus 14% in the treatment group; a RRR of 26% and an ARR of 5%. In the highest-risk subgroup, 40% of patients in the observation group and 28% in the treatment group developed POAG; a RRR of 30% and an ARR of 12%.[15]

The authors concluded that the 13-year results showed that high-risk OH patients might benefit from more frequent follow-up examinations and earlier treatment, while treating the lowest-risk OH patients provided little value: these patients required less-frequent clinical evaluation and would not suffer from delayed treatment. They also suggested that if, in fact, there was little harm to delaying treatment, with no increased incidence of the disease once treatment was initiated, then watchful waiting could be another viable option in all patients. Unfortunately, they could not provide specific guidance on what constituted watchful waiting, since long-term functional consequences were unknown. They estimated that this question could be answered with an additional 5-20 years of follow-up.[15]

Phase II determined that patients in the observation group had a significantly worse PSD slope. This result had limited influence, however, since change was defined based on how follow-up visual field results differed compared to those in an age-matched normal, which is known as an event analysis.[36] Visual field testing exhibits both intra-test and inter-test variability of between 2 and 3dB, which can undermine the correct interpretation of the patient's visual status[37] The OHTS investigators originally defined a visual field abnormality as 2 consecutive abnormal fields with the abnormality in the same location and on the same index, believing this to be sufficient to detect meaningful change.[34] Under this initial criterion, a staggering 86% of first-occurring abnormal visual fields were not confirmed on the next retest.[38] This illustrates the inherent difficulty in confirming a meaningful visual field abnormality with limited testing using a test with known variability. This result obviated the fact that the initial abnormality criterion was unacceptable, prompting the investigators to change the criterion for abnormality to a more stringent requirement of 3 consecutive abnormal fields with the abnormality in the same location and on the same index.[38] Although the revised OHTS visual field abnormality criterion countered the fluctuation in testing, thus providing more repeatable and meaningful data, the study's use of an event analysis to confirm change had its disadvantages. The limitations of an event analysis include the underutilization of many intervening VF tests when determining if change has occurred and the lack of an estimated rate of change.[36] A better indicator of change, known as a trend analysis, tracks intra-subject, longitudinal variability of specific visual field points or the entire field itself. [39] De Moraes et al.[39] , in a follow-up OHTS publication, used a trend analysis to compare the rate of visual field change before and after the initiation of treatment in patients who were originally assigned to observation. Treatment decreased the global visual field mean deviation rate of change by 74% and the localized rate of change by 53%. The benefit of treatment extended both to patients who converted to POAG and those who did not. The authors noted that the rate of change in patients who converted to glaucoma was still significant and suggested that the target IOP be adjusted more aggressively in these patients than when they were classified simply as ocular hypertensives.

Although the OHTS had a tremendous impact on our understanding of these patients, the authors noted some limitations to the study:

1. The target of a 20% reduction in IOP was not considered to be ideal; it was simply realistic for the medications that were available at the start of the study. It is conceivable that the percent risk reduction would have been even greater in the treatment group if a more aggressive target had been set and achieved.

2. OHTS was not designed to be an assessment of ocular hypertension in the general population. This was a convenience study involving healthy volunteers and is not generalizable to patients who do not have baseline characteristics similar to those in the OHTS subjects.

3. The threshold for diagnosing POAG was very high given the available diagnostic techniques at the time.

4. One-third of OHTS participants were considered to be high-risk based on the strict criterion of IOP of 24-

32 mmHg in the higher study eye.[15] The authors speculated that most of the general public with OH likely have lower IOPs than this criterion, and consequently have a lower risk profile than the patients involved in the study. The two phases of this very well-controlled study definitively showed that early treatment of patients with high-risk ocular hypertension successfully delayed or prevented the development of glaucoma, whereas early treatment of low-risk patients was of little value.

IMAGING IN OH PATIENTS

Trends in the diagnosis and management of glaucoma show a substantially increased reliance on objective imaging of the optic disc, retinal nerve fiber layer and ganglion cell complex, with a concurrent decreased reliance on visual field testing.[40] When OHTS began, these imaging capabilities were not readily available, and structural glaucoma changes were determined by comparing stereoscopic disc photographs. One of the first commercially available technologies that could objectively assess the optic disc and retinal nerve fiber layer was the confocal scanning laser ophthalmoscope (CSLO), specifically the Heidelberg Retinal Tomogram (HRT). In a prospective, ancillary study to OHTS, the investigators sought to determine, using the HRT, whether optic disc topographic measurements are an accurate predictor of visual field loss, as well as how effective the CSLO is in detecting the presence and progression of glaucomatous optic disc damage.[41] The study revealed that multiple baseline optic nerve head parameters were significantly associated with the development of glaucomatous disc or visual field damage.[42] Specifically, the baseline Glaucoma Probability Score (GPS), Moorfields Regression Analysis (MRA) and stereometric parameters showed similar predictive abilities as models using the photograph-based horizontal cup-to-disc ratio.[43] The study also compared the rate of structural change in OH patients who developed glaucoma to that in those who did not. The authors found that the rate of rim area loss in patients who developed glaucoma was five times faster than that in those who did not develop glaucoma.[44] Although this study only involved CSLO technology, it is reasonable to conclude that other forms of objective imaging technology may play a significant role in both helping to predict who is at risk for developing glaucoma and how a practitioner can view the rate of change when ascertaining that the patient is converting to POAG.

Optical coherence tomography (OCT), which was not commercially available at the time of OHTS recruitment, is now ubiquitous in glaucoma management and can be used to detect disease years prior to repeatable visual field loss. Kuang et al.[45] investigated the estimated lead time gained by retinal nerve fiber layer (RNFL) measurements using OCT for detecting glaucoma prior to the development of VF loss in glaucoma suspects. They estimated that up to 35% of eyes have an abnormal average RNFL thickness 4 years before the development of visual field loss and 19% of eyes have an abnormal RNFL thickness 8 years before visual field loss. Incredibly, these results are consistent with the finding by Sommer et al.[46] in 1991 that 60% of studied glaucoma eyes had photographically detectable nerve fiber defects 6 years before the development of glaucomatous field defects. Although the OHTS ancillary study was performed with CSLO technology, RNFL assessment with OCT has now been shown to be superior to CSLO for detecting pre-perimetric glaucomatous damage in glaucoma suspects.[47] Colombo et al.[48], in a study of 68 untreated ocular hypertensives, assessed the correlation between the 5-year risk of developing glaucoma and the condition of the optic nerve head and retinal nerve fiber evaluated by OCT, scanning laser polarimetry and CSLO. They found significant correlations between OCT RNFL parameters and an individual's risk to develop POAG that did not exist with the other two technologies. Multiple smaller studies have determined that either mean RNFL or segmental RNFL measurements are thinner in OH patients than in normals. However, these studies did not demonstrate any uniform OCT parameters that might reliably predict the development of early glaucoma in OH patients.[49-55] Since OCT is superior to CSLO, it would be interesting to see the predictive capability of OHTS ancillary imaging if OCT had been available and used in that study. Additionally, although the sensitivity and repeatability of OCT technology is indisputable, the fact that Sommer et al. achieved results similar to those of Kuang et al. 24 years earlier reinforces the notion that photographic assessment of the retinal nerve fiber layer is a powerful tool that should not necessarily be rendered obsolete.

RISK FACTORS

In the management of any chronic or potentially chronic disease state, the primary care optometrist's principal job is to appropriately manage risk to prevent adverse outcomes. A small subset of OH patients will develop glaucoma, ultimately with the risk of visual impairment. A review of the available literature shows that the 15-year risk estimates of unilateral blindness range from 3.1 to 10.5% in untreated OH patients and 0.9 to 8.6% in treated OH patients.[56,57] Although these percentages seem low, their impact is severe. An understanding of the importance of various risk factors for progression and their application is pivotal to providing an informed consultation with the patient to reduce their risk of blindness. In the planning phase of OHTS, 20 baseline demographic and clinical factors were identified that might predict which patients would be more likely to develop glaucoma. Six years into the study, the relevant risk factors for conversion to glaucoma from OH were baseline age, vertical and horizontal cup-disc ratio, PSD, central corneal thickness (CCT) and intraocular pressure.[58] Interestingly, although multiple studies have shown an association between diabetes and the development and progression of glaucoma, OHTS initially found that diabetes conferred a protective effect against the development of POAG.[58-63] The authors later acknowledged methodological issues that might account for this protective effect. With the use of more specific definitions for a present condition of diabetes, a history of diabetes was not significantly associated with protection against glaucoma.[64] Additionally, although it has been suggested that the prevalence of POAG in African-Americans is 4-5 times higher than that in individuals of European descent, after adjusting for a thinner central corneal thickness and a larger cup-to-disc ratio at baseline in this demographic, race itself was not a statistically significant predictor of the development of glaucoma.[58,65-68]

The strongest and arguably most novel of the independent predictive risk factors noted above was CCT. Simply put, the risk of developing POAG is inversely correlated with the CCT. The study showed that average CCT was 553.1±38.8 µm among study participants who developed POAG and 574.3±37.8 µm among those who did not develop glaucoma. Subjects were further divided into three thickness subgroups: thin, intermediate and thick. The thin subgroup (average CCT of 530.8µm) had a greater than three-fold higher risk of developing glaucoma than the thick subgroup (average CCT of 613.5µm).[58] These findings mandate the use of CCT to evaluate risk in patients with ocular hypertension.

More recent studies on glaucoma have suggested that the relationship between the cornea and glaucoma involves more than just the anatomic thickness of that anterior tissue.[69] It can be difficult to differentiate glaucomatous eyes from OH eyes on the basis of CCT alone, since there is a substantial overlap in thickness between the two groups.[70] Although corneal hysteresis (CH) was not included in the predictive risk factors assessed by OHTS, since it was not on the radar at the time, it has since emerged as an important risk factor for the development of, severity of, and rate of visual field loss in glaucoma.[71-77] Corneal hysteresis is considered to be a measure of corneal viscous dampening, and thus directly assesses the cornea's resistance to deformation.[78] It has been proposed that the characteristics of the corneal tissue itself, such as the ability to resist deformation, might reflect the constitution of the extracellular matrix (ECM). Since the cornea, sclera, peripapillary ring and lamina cribrosa are essentially constructed of that same ECM, it is plausible that their biomechanical characteristics might be similar.[74] It has been proposed that an eye with more deformable anterior ocular tissues (cornea) might also be at higher risk for glaucomatous damage secondary to the effect of IOP on posterior ocular tissues.[79] It has additionally been demonstrated that eyes with lower CH seem to be associated with altered optic nerve head compliance during the adjustment of IOP.[79] Multiple studies have demonstrated that patients with various forms of glaucoma have significantly lower corneal hysteresis values than normals.[71,72,80-86] Sullivan-Mee and co-workers[70] assessed CH, CCT and IOP in patients with OH and POAG and found that only CH was independently associated with POAG and CH was the only variable that differentiated OH from POAG, with significantly lower CH in the POAG group. Consequently, the measurement of corneal hysteresis in OH patients can provide additional information that can help the optometrist when assessing the risk of conversion.

The presence of optic disc hemorrhage (DH) is widely accepted as one of the strongest risk factors for the development and progression of glaucoma.[87,88] DH is rarely found in normal eyes and its prevalence in OH patients has been reported to range from 0.04% to 10%.[89] Although patients with DH at baseline were excluded from participation in OHTS, the investigators did monitor their presence over an average follow-up of 96.3 months. They sought to compare the rate of DH detection by clinical examination and photographic review, to assess the incidence of and predictive factors for DH in annual disc photos, and to determine whether DH predicted the development of POAG in the OHTS participants.[90] They found that only 16% of DH were detected by clinical examination, and 84% were detected by photographic review. The discrepancy between clinical and photographic detection in this study has not been noted in other studies.[91,92] The baseline risk factors in participants with DH were similar to those in participants who developed glaucoma: older age, increased cup-to-disc ratio, and thinner CCT. Patients with DH were six times more likely to develop glaucoma than those without DH. The cumulative incidence of POAG in eyes with DH was 13.6%, compared to 5.2% in eyes without DH, suggesting that DH are additional predictive risk factors for the development of POAG. However, the authors cautioned that, since 86.7% of the participants with DH did not reach a glaucomatous end point by the end of follow-up, it could not be concluded that disc hemorrhages are synonymous with glaucoma. Furthermore, they suggested that the initial results do not direct practitioners to treat all patients with OH who have DH.[90] In a ≥5 year follow-up study, the OHTS group compared the rate of visual field change in eyes with and without DH: the rate of visual field deterioration in eyes with DH was more than twice that in eyes without DH. Randomization to the treatment group decreased the likelihood of developing DH, implying that treatment may provide a protective effect against DH. The authors concluded that the presence of DH should alert the managing clinician to a heightened risk that may require more aggressive intervention to prevent a negative clinical outcome.[93] Given the negative prognostic importance of DH, to accurately assess the risk and appropriately intervene, it is critical that the clinician look for the sometimes subtle presence of DH using a combined approach of concentrated clinical examination and stereoscopic disc photography.[87,88]

RISK ASSESSMENT/ RISK CALCULATORS

Since OHTS demonstrated that treatment was efficacious, it might seem reasonable to conclude that treating all patients with OH is an appropriate preventative measure that hedges against glaucoma. However, after an exhaustive analysis, the OHTS investigators concluded that the treatment of all ocular hypertensive individuals is neither medically indicated nor economically justifiable due to the high prevalence of the condition, the low conversion rate to POAG and the cost, inconvenience, and possible adverse effects of treatment.[14] The important point is that the OHTS identified that a substantial susceptible minority of patients can benefit from medical intervention and identification of these individuals is critical. Specifically, the 5-year risk of converting to glaucoma was 36% in the highest-risk subgroup (>13% estimated 5-year risk of glaucoma) and predicted to be 42% at 10 years in that subgroup.[35,58] In comparison, the lowest-risk subgroup (<6% estimated 5-year risk of glaucoma) had a 5-year risk of conversion of 2% and a predicted 7% risk at 10 years.[35,58]

Although knowledge of the factors that can predict the development of glaucoma is crucial, integrating this knowledge into the care of an individual OH patient is far from a simple, streamlined process. To help streamline this process and provide a consistent template with which to make evidence-based decisions, multiple prediction models have been developed.[94-96] For these models to be confidently accepted by practitioners, there must be some conclusive evidence to support their utility. Prediction models are developed from study populations and as a result cannot always be generalized beyond that specific population. It is widely accepted that a prediction model should not be applied in clinical practice before it has been validated in at least one other population and preferably by different investigators.[97] The most prominent validated risk prediction model available relies on pooled data from the observation group of the Ocular Hypertension Treatment Study and the placebo group of the European Glaucoma Prevention Study (EGPS).[98] EGPS, much like OHTS, sought to evaluate the efficacy of reducing IOP to prevent or delay the development of POAG in patients affected by OH. EGPS was a multicenter randomized, double-blinded, placebo-controlled clinical trial involving 1,077 Caucasian subjects between 30 and

80 years of age with open angles, an IOP of at least 22 mmHg but not higher than 29 mmHg in one eye, and two normal and reliable visual fields.[99] EGPS identified multiple predictive factors for the development of glaucoma that were highly consistent with OHTS, including older baseline age, larger vertical C/D ratio, higher PSD, and thinner CCT.[100] Based on these consistencies, as well as other key similarities in their respective definitions and protocols, the OHTS and EGPS groups were able to collaboratively pool and analyze their data. This resulted in a more statistically sound risk-prediction model based on a larger number of participants and a larger number of POAG end points.[97] From this prediction model the collaborating groups developed a risk calculator that could be useful in the clinic to assess an individual's 5-year risk of conversion to POAG. There are two OHTS-EGPS based systems available for users of the calculator: one using a Cox proportional hazards model and one using a point system.[97] These calculators may be accessed at http://ohts.wustl.edu/risk/calculator.html. Case examples are presented to demonstrate their appropriate use. The caveat is that these calculators will be most useful in patients with clinical characteristics similar to those of the patients enrolled in these studies.

Although the 5-year risk of converting to glaucoma from OH is a highly interesting piece of information, most optometrists may not find this percentage particularly meaningful in their treatment decisions. Instead, the answers to more clinically relevant questions, such as; "Given what you see today, at what IOP would you have recommended IOP lowering?" and "If the patient were to come back in 6 or 12 months, all other things unchanged, how much higher would the IOP have to be for you to initiate treatment?" might be more meaningful for most practitioners. Jampel and Boland[101] asked these exact questions and sought to provide evidence-based answers. Using data from the combined OHTS/EGPS analysis they developed a 5-year risk calculator, known as the "threshold to treat" calculator, that produces an IOP, rather than percentage risk, at which treatment should be strongly considered.[101] This calculator may be accessed at http://oil.wilmer.jhu.edu/threshold. Since IOP is easily and often assessed, and the only clinically modifiable risk factor in glaucoma management, this calculator repackages the data to provide information that is more commonly used and likely more relevant in practice. The threshold to treat calculator is clearly impactful, but has the same shortcomings as the OHTS/EGPS risk calculator: it captures only the static IOP acquired by tonometry at the time of recording, and fails to consider the dynamic nature of IOP, which is rarely completely assessed in the clinical setting. [101]

CONFOUNDING FACTORS/CAPTURING IOP

Intraocular pressure is a dynamic process, the variation of which may confound risk assessment in patients with ocular hypertension. It is well known that IOP varies spontaneously over a 24hr period.[102] Therefore, measurement in an office setting results in an incomplete picture. Although serial tonometry during office hours may better capture diurnal variation, peak IOP has been reported to occur outside of normal office hours in most patients.[103,104] In fact, Jonas et al.[105] showed that any single IOP measurement acquired between 7:00 am and 9:00 pm had a 75% probability of missing the peak of the 24hr IOP curve. Accordingly, IOP data gathered over a 24-hr period provides the most complete assessment of an individual's risk characteristics. Grippo et al.[106] compared the 24-hr IOP patterns of healthy patients to those of patients with untreated OH and early signs of POAG. After the investigators established baseline 24-hr IOP curves, patients were monitored over 4.3±3.8 years for glaucoma development. Diurnal and nocturnal curves were compared among the groups. Patients from the untreated OH group who converted to glaucoma manifested similar baseline 24-hr IOP curves as those in the initial glaucoma group, and were dissimilar to both the healthy controls and non-converters. Specifically, both the converters and initial glaucoma group exhibited higher diurnal mean IOPs as well as greater diurnal IOP variation compared to healthy controls. Although continuous IOP-measuring devices are on the horizon, they are not yet practically usable.[107] This study shows that acquiring multiple IOP readings at different times of day in an office may provide adequate risk assessment, without capturing the true variability in 24-hr IOP.

Diurnal assessment does not, however, account for the long-term variability of IOP measured at multiple examinations over time. Bhorade et al.[108] analyzed IOP data from the OHTS with the goal of describing the variability of IOP measurements within the same eye and between the right and left eyes over a 60-month period.[108] They found that 13% of eyes had a difference in IOP of >20% between two consecutive visits. The mean absolute difference in IOP measured within the same eye between all consecutive visits was within 3 mmHg in 66%, between 3 and 5 mmHg in 24%, and >5 mmHg in 10%. Although the authors noted that the strict study protocols likely minimized the variability typically seen in clinical practice, the findings additionally highlight the complexity of obtaining consistent IOP data from which to adequately assess risk in ocular hypertensives.

Independent of the physiological properties of IOP, over-detection secondary to systematic errors in tonometry may lead to unnecessary treatment, resulting in an undue burden of treatment on the patient. Conversely, under-detection and treatment may have dire consequences with respect to vision. In clinical practice, measurement of IOP is compulsory and used to screen for high-risk characteristics and monitor variations in the disease state, as well as to evaluate the efficacy and effectiveness of treatment. Most practices use Goldmann applanation tonometry to achieve these purposes. Both Goldmann applanation and non-contact tonometers are known to produce clinically significant systematic errors if inadequately maintained and calibrated.[109-113] An analysis of IOP data from 3,654 participants in the Blue Mountains Eye Study revealed that a tonometer that consistently under- or over-reads by 1 mmHg will miss 34% of individuals with OH or yield 58% more positive screening tests, respectively.[114] This study underscored the need to maximize the repeatability of measurements through calibration.

In the actual management of glaucoma or ocular hypertension, the aforementioned historical assumption that day-to-day IOP variation is repeatable at any given time has led to the widespread practice of quarterly "pressure checks", performed at similar times of day, to help the practitioner gauge the efficacy and effectiveness of their prescribed treatment.[115] Any difference in IOP from baseline is then attributed to the effect of medication or patient non-adherence. Multiple studies have shown that diurnal IOPs and the measurement of these IOPs are not repeatable in the short term in treated glaucomatous individuals.[116-120] Rotchford et al.[115] examined the justification for determining the effectiveness of medication using the traditional time-of-day standardized approach in treated patients with ocular hypertension. The variation of repeated IOP measurements in treated OH patients at the same time on different days lies within a range between ±21.2% and ±23.1% from baseline. The authors concluded that, even under ideal conditions, a day-to-day variability of ±20% significantly undermines both the precision of IOP measurement and the estimation of medication effectiveness even when the time of day is standardized.[115] These studies suggest that optometrists should obtain multiple IOP readings prior to assessing the success or failure of therapy in OH patients they elect to treat. A clinical assumption that an ineffective treatment is effective and conversely that an effective treatment is ineffective carries multiple risks and only increases the potential burden on the patient, which can avoided by the careful practitioner.

VALUE OF A RISK CALCULATOR IN PRACTICE

Although the OHTS-EGPS risk calculator has been shown to be accurate in multiple populations, the application and influence of this calculator in routine practice can be debated and may even meet with resistance by some physicians. A study conducted by Mansberger and Cioffi[121] compared the ability of ophthalmologists to estimate an individual's risk of converting to glaucoma to the results of a risk calculator. They showed that there was a high range of probability estimates among practitioners, which could potentially lead to under- and over-treatment and underscores the need for a tool that would give consistent results.

Boland et al.[122] studied whether physician subspecialty training, access to a formal risk calculator or patient age influenced physician treatment recommendations in cases of OH. Using the results from OHTS, the authors generated 50 simulated case scenarios. These scenarios used the 5 risk factors identified by OHTS found in the risk calculator, in addition to the patient's diabetic status. One hundred eighteen members of the American Academy of Ophthalmology and 58 members of the American Glaucoma Society participated in this study by reviewing these cases with and without an estimated risk of conversion. The authors determined that inclusion of the risk calculator significantly increased physician confidence and reduced inconsistency in the decision-making process. Specifically, addition of the risk calculator decreased the threshold to treat from a 22% risk of conversion over 5 years to 17% in glaucoma subspecialists, and from 16% to 13% in a non-glaucoma-trained group.[122] They concluded that, at least in simulated cases, the participating physicians underestimated the risk of developing glaucoma. This study supports the potential of the risk calculator to provide more confident and accurate management, which would hopefully reduce the functional consequences of under-treatment.

Practically, if the risk calculator is to be a truly useful decision-support tool, it would need to have significant inter-visit repeatability, in a non-study, real-world clinical setting. Song et al.[123] investigated the longitudinal variability of the risk calculator in a glaucoma referral practice. They reviewed the charts of 27 untreated OH patients for a mean of 98.3±18.5 months. Using the OHTS/EGPS risk calculator to calculate glaucoma risk for each patient at each follow-up visit, they determined that the 5-year estimated risk of conversion to POAG among untreated patients varied substantially (up to 10-fold) during follow-up. Specifically, the baseline risk of conversion was 14.0± 12.0% (range 2.9 to 49.2%) in the non-POAG group, and 22.5±11.5% (range 14 to 52.3%) in the group that developed POAG.[123] The results of this study highlight the danger in making decisions based on a single risk calculation. In daily practice, data points can exhibit substantial fluctuations, most notably for IOP, for which complete diurnal and nocturnal curves are not routinely obtained. The authors concluded that "ultimately, the availability of and access to a risk calculator does not guarantee widespread adoption by clinicians, nor does the data derived from that calculator, although compelling in spite of variability, mandate its use at this juncture".[123]

EFFECTIVENESS OF TREATMENT

When interpreting the results of any randomized clinical trial, it is important to determine whether a statistically significant result is also clinically significant. Clinical significance refers to the size of a treatment effect at which a clinician feels adoption of a treatment modality would be justified in clinical practice.[124] The "number-needed-to-treat" (NNT) has been used to apply valid, statistically significant results to the care of individual patients. Since we cannot precisely know which patients will benefit from treatment, the NNT gives an estimate of how many individuals will need treatment before any one patient will realize a benefit.[125] NNT is derived by calculating the inverse of the absolute risk reduction.[126] An ideal NNT is 1; treatment of 1 patient prevents 1 harmful outcome. Although NNT has been used to apply the results of RCTs to individuals, it is a statistical construct based on averages from these RCTs.[57] The caveat is that these NNTs are not perfectly applicable to individuals who do not resemble patients from the RCTs. Nonetheless, NNT provides some understanding and general guidance that is not otherwise apparent in assessing the value of prophylactic treatment in patients with OH. In fact, when clinicians and policymakers have been presented with research results in different formats, they made more conservative decisions when they received treatment effects expressed as NNTs than when they received them as relative or absolute risk reductions.[127]

An example of a NNT comes from the field of cardiology. In a meta-analysis of 10 RCTs (70,388 total subjects) that explored the benefit of statin use in people without established cardiovascular disease but with cardiovascular risk factors, Brugts et al.[128] assessed all-cause mortality and major coronary and cerebrovascular events, and found that the respective NNTs were 167, 77, and 250, respectively. In this example, 250 patients would require treatment to prevent one major cerebrovascular event. Further, if the treating doctor considers that this low potential of success outweighs the burden of treatment, then they accept the fact that they will be unable to predict which of those 250 patients will benefit from, be harmed by, and be unaffected by the treatment. It is important to note that, although a NNT of 250 seems prohibitively high relative to an ideal of 1, it is inappropriate to compare NNTs across disease states of varying severities. NNT is a function of the severity of the disease, the intervention undertaken, and the likely outcome.[127]

This clinical conundrum of who to treat is no different in the case of ocular hypertension, although the NNTs may be more or less acceptable depending on how the clinician views the severity of the potential outcome. The 10-year estimated incidence of POAG was reduced by approximately 50% in all three OHTS risk subgroups, consistent with the relative risk reduction found at the 5-year point of the study.[35] The absolute risk reduction in each subgroup may be a more useful statistic than measuring the relative risk reduction, which can be misleading in that individuals with substantially different absolute risks may have the same relative risk percentage. The absolute risk reduction is the difference in the rate of an outcome, POAG in this case, in the control group minus that rate in the treatment group.[124] In the lowest-risk subgroup 7% of the observation group and 4% of the treatment group developed POAG, an approximate 50% risk reduction, but a minimally convincing absolute risk reduction of just 3% over 10 years.[35] Expressed in NNT, 33 (1 divided by 0.03) patients would need to use daily eye drops for 10 years to prevent one patient from developing POAG as defined by the OHTS criterion. In the highest-risk subgroup, at 10 years, 42% and 19% of the cases in the observation and treatment groups, respectively, developed POAG, for an ARR of 23% and a NNT of approximately 4 (1 divided by 0.23). It can be asserted that treating 4 patients with daily medications over 10 years to prevent a case of glaucoma is more impactful than treating 33 to achieve the same result. The NNTs found in the 13-year review of the low-, moderate- and high-risk subgroups from phase II were 98, 16, and 7, respectively, which constitutes additional evidence that the benefit of treatment is most evident in the group with higher baseline risk.[15] In summary, NNT can be a valuable part of decision-making. Unfortunately, it fails to predict which of the treated patients will benefit from treatment. Like all research results, NNT should not be used in isolation, but rather should be integrated with patient preferences, caregiver experience and judgement, and local constraints and conditions.[127]

When considering a treatment's efficacy, it is also critical to assess the significance of the treatment's adverse effects. This provides a comprehensive assessment of the risk/benefit ratio in treatment. Treatment safety was monitored throughout OHTS, and there was no evidence of excess risk in the medication group for reported symptoms, overall number of new medical conditions, worsening of preexisting conditions, hospitalizations, or mortality.[33] The authors suggested that these safety findings support the notion that the treatment protocol in that study was successful. This favorable benefit profile, although not perfectly applicable outside of that study, should further allay concerns about treatment.

The use of healthcare resources is, by economic measures, not worthwhile unless there is a corresponding benefit. Evaluating the economic value of a treatment is an additional way to assess a treatment's effectiveness. The OHTS group analyzed the cost-utility of treatment on a hypothetical cohort of people with an IOP≥24 mmHg. Four treatment thresholds were considered: (1) treat no one; (2) treat those with a ≥5% annual risk of developing glaucoma (approximately 10% of the subjects in OHTS); (3) treat people with a ≥2% annual risk of developing POAG (approximately 30% of the subjects in OHTS) and (4) treat everyone. The value of treatment was based on how that intervention impacted the patient's quality of life, expressed in quality adjusted life-years (QALY).[14] Treatment is considered to be cost-effective if the value placed by society on the QALY exceeds the cost that society would expend to acquire that QALY.[129] The authors concluded that the treatment of patients with an IOP of ≥24 mmHg and a ≥2% annual risk of developing glaucoma is likely to be cost-effective.[14] This is equivalent to a ≥10% risk of developing glaucoma in the 5-year risk period used in OHTS. This signifies that it would be cost-effective to treat approximately 30% of patients resembling the study group from OHTS. For an additional perspective on this ≥2% annual risk threshold, Boland et al.[130] assessed the threshold to treatment tolerance of glaucoma specialists, and found an average tolerance of a 4.6% annual risk of developing glaucoma without and a 3.4% annual risk with a risk calculator. This indicates that subspecialists are willing to treat approximately 10% of patients involved in OHTS. Therefore, a 2%/year threshold to treat could be considered fairly liberal, relative to subspecialist clinicians, and still be cost-effective. Kymes et al.[131] also later evaluated the influence of a patient's life expectancy on the cost-effectiveness of preventative treatment. They concluded that, assuming a willingness to treat approximately 30% of OHTS participants, an OH patient would need to live at least an additional 18 years to make treatment cost-effective to society. In higher-risk categories, the required life expectancy would be reduced to 7 to 10 years.[131] Although cost-effectiveness is, undoubtedly, a less personal model of the effectiveness of treatment, it still provides an additional perspective.

TREATMENT

As previously mentioned, the treatment goal in OHTS, was to achieve a minimum 20% reduction from the average of the qualifying IOP and the IOP at the baseline randomization visit.[28] The 20% target IOP was considered to reflect current clinic practice at the time and is still considered a reasonable initial target in managing OH patients who are at a moderate risk of conversion.[34,132-136] When OHTS was initiated, 94% of participants were prescribed topical -adrenergic antagonists (-blockers) in an attempt to meet that target.[137] Notably, none of the patients initially used prostaglandin analogues (PGAs) due to their lack of availability at the start of the study. However, at the end of phase I, close to 50% of patients were prescribed PGAs[34]. Mono-therapy with any agent was not always sufficient to achieve the target IOP reduction. In phase I, 2 or more topical medications were prescribed for 39.7% of participants, and 3 or more medications were prescribed for 9.3% of participants.[34] In an OHTS comparison of the IOP response to blockers and PGAs, PGAs reduced IOP by an average of 2.1 mmHg and 1.3 mmHg more than blockers in African-American and Caucasian patients, respectively.[137] Medeiros et al.[138] reported that each 1-mm Hg-higher average follow-up IOP increased the risk of conversion from OH to glaucoma by 20%. This emphasizes the need to use the most efficacious medication in these cases. Therefore, PGAs are the initial medication of choice in the goal of at least a 20% or greater IOP reduction in treated OH patients.

Although selective laser trabeculoplasty (SLT) is not widely employed in optometric care, it is an additional first-line therapeutic option. A meta-analysis on the efficacy of SLT with open angle glaucoma showed that SLT is not inferior to medication for reducing IOP and achieving treatment success.[139] In high-risk OH patients, Shazly et al.[140] demonstrated that SLT can be particularly beneficial in those with CCT of <555µm, with an effective duration of at least 30 months post-treatment. Several studies have also concluded that SLT may offer cost advantages over medical therapy. Lee and Hutnik[141] compared the projected 6-year cost of SLT to topical medications in the Ontario Health Insurance Plan (OHIP) for patients with open-angle glaucoma aged 65 and older. Based on the assumption that bilateral 180-degree SLT was repeated 3 years from the initial treatment, SLT resulted in a savings of $580.53, $2,042.82 and $3,366.65 per patient over mono-, bi- and tri-drug therapy, respectively, over that same 6 years.[141] Seider et al.[142] showed similar findings in that SLT was less expensive than most brand-name medications within 1 year and less expensive than generic latanoprost and generic timolol after 13 and 40 months, respectively. Stein et al.[143] determined that both PGAs and laser trabeculoplasty are cost-effective options for the management of newly diagnosed mild open angle glaucoma compared to observation. Based on the assumption that patient adherence to topical medication is not 100%, they estimated that, at current PGA prices, laser trabeculoplasty may be a more cost-effective alternative than PGAs. Ultimately, the selection of a specific topical hypotensive medication or use of SLT will be determined by the individual patient's systemic and ocular health status, risk tolerance and insurance factors.

CONCLUSIONS

The management of Ocular Hypertension is an ongoing challenge for the primary eye-care practitioner, and is complicated by an uncertain disease course and evidence-based research showing that the vast majority of patients will not develop POAG. The evidence clearly supports the treatment of patients with high-risk characteristics and treatment of approximately 1/3 of patients can be economically justifiable. Age, health status, life expectancy, burden of treatment, quality of life, patient and practitioner risk tolerance and attitudes toward disease and treatment all add to the complexity of the decision-making process. The decision to treat is serious, since it potentially sentences the patient to life-long treatment without a guarantee of benefit from that treatment. Decision-support tools such as the OHTS/EGPS risk calculator and "threshold to treat" calculator reduce uncertainty and provide direction that was previously unavailable. However, they are limited by variations in IOP and the ability to observe those variations. A patient-centered approach is necessary in cases where the absolute need to treat can be disputed. In concert with evidence-based risk assessment, this approach can effectively guide the optometrist and informed patient in enacting customized management that is appropriate for the individual.

"Clinicians should make certain that their patients have a clear understanding regarding the risk of disease progression and its potential impact on their quality of life in advising them concerning treatment options. Those patients who are more risk averse are more likely to view treatment as beneficial, although those patients with greater tolerance for risk of progression and an aversion to medication may perceive less benefit." – The Ocular Hypertension Treatment Study Group

Illustrative Case

This case is a typical example of OH encountered in our practice and reflects the complexity of management decisions in these patients. Our patient was a 70-year-old Caucasian male with a stable history of prostate cancer post-radiation and hormone therapy x 5 years, post-amputation secondary to peripheral vascular disease (currently on warfarin), and well-controlled hypertension and hyperlipidemia. His intraocular pressures ranged from 23-33 mmHg OD, OS, and the average of 8 IOP readings over the last 3 years was 28 mmHg. CCTs were 599 and 597 µm, respectively. Corneal hysteresis values were 10.5 mmHg and 10.7 mmHg, which are average for a Caucasian and confer no additional risk. Optic nerves (Fig. 1) were judged by multiple examiners to be .25 OD/OS and cp-RNFL measurements were unremarkable (Fig. 2). Visual fields (Fig. 3) showed mild "reverse cataract" patterns in each eye due to patient over-performance on this initial field. MDs were both positive and there were no glaucomatous defects. With the OHTS/EGPS risk calculators found at http://ohts.wustl.edu/risk/calculator.html, the point system generates a 5-year estimated risk of POAG of 10% and 3.5% with the continuous method, using an average of 28 mmHG. These percentages would fall in the moderate- and low-risk subcategories of OHTS, respectively. With the "Threshold to Treat" calculator at http://oil.wilmer.jhu.edu/threshold/, and with an estimated threshold for a 5-year risk of progression of 13% (based arbitrarily on the lowest percentage in the highest-risk subcategory), the IOP threshold to initiate treatment exceeds 32 mmHg. After we educated the patient on his risk of developing glaucoma, the risk of functional loss from glaucoma, and what treatment would entail, we and the patient mutually decided to continue monitoring. This case perfectly illustrates the need to comprehensively assess the risk in OH beyond IOP, the critical role of CCT in increasing or decreasing that risk, and the burden of treatment relative to the likely benefit of treatment. In this case, the mutual decision to delay treatment was multifactorial and included the patient's poor health status, current burden of systemic medical therapy, age and limited life expectancy, risk assessment and the risk tolerance of both parties. A different patient with the same risk factors and different attitudes toward risk and treatment may desire treatment, which reinforces the notion that there is no one-size-fits-all approach to these patients. ●

Figure 1: *ONH Photos*

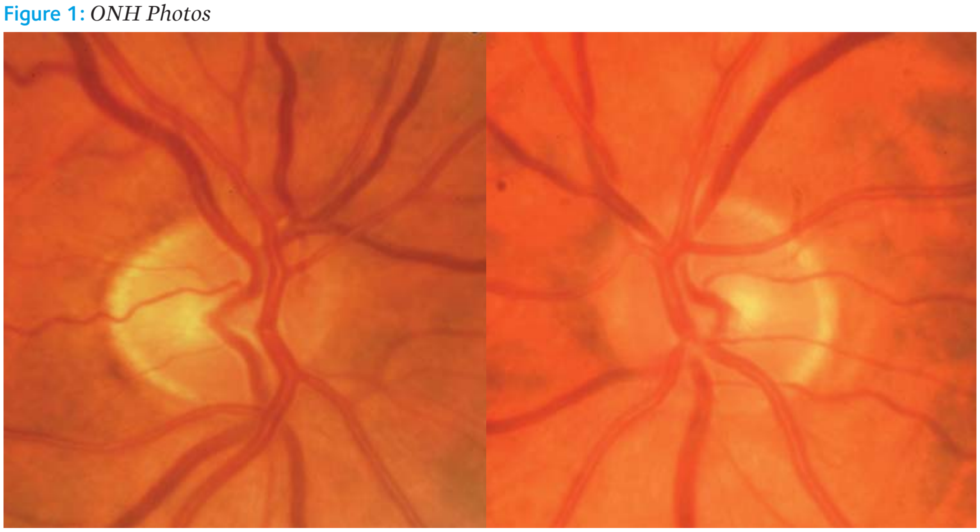
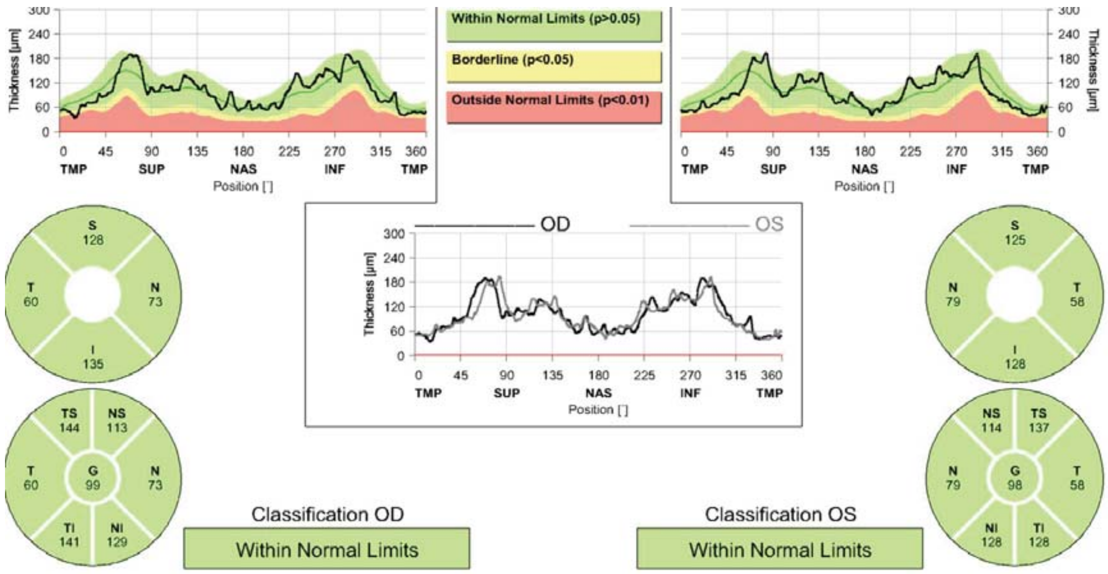
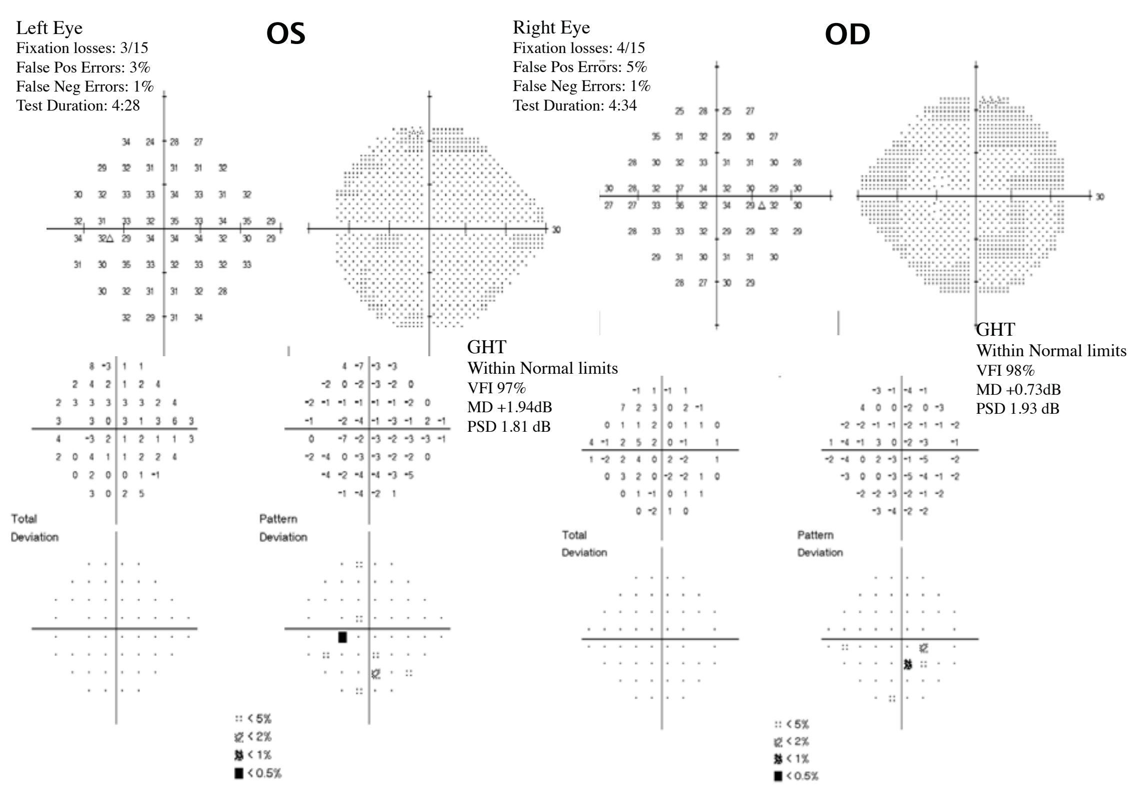


Figure 2: *Cp-RNFL*



Cp-RNFL scan has good quality scores with good segmentation and good reflectivity. Inter-eye and intra eye symmetry is excellent and retinal thickness is well within normals per the normative database. No apparent pathology exists.

Figure 3: *Visual Fields*



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Optocase Mini

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A 23 year old male presents with a lesion on his right upper lid. He says he first noticed the lesion approximately 6 weeks ago, at which time it was red and painful. Over the following weeks, the redness and pain subsided but he still has a visible nodule on the right upper lid. He reports no other complaints such as red eye, decreased vision, or diplopia. His past ocular and medical history is unremarkable.

On exam, a firm nontender nodule is palpated deep in the right upper lid close to the lid margin. The lesion does not appear inflamed. The patient also has evidence of some mild blepharitis, with a small amount of thick white discharge expressed from glands with gentle lid pressure.

Question:
What is the most likely diagnosis?

(a) Stye

(b) Sebaceous cell carcinoma

(c) Chalazion

(d) Insect bite

ANSWER TO OPTOCASE MINI

Answer: Chalazion
A chalazion or meibomian cyst is a benign lesion of the eyelids occurring as a result of obstruction to a meibomian gland or gland of Zeis. They are most common in adults and occur equally in males and females. They are the most common inflammatory lesions of the eyelid.[1]

Presentation
A chalazion is most often painless. It presents as a mild to moderately tender red swelling of the upper or lower eyelid. [2] The onset of chalazion is typically over a few weeks, with the redness and tenderness subsiding as the lump remains.[2] They are more common on the upper eyelids due to the increased number and length of meibomian glands on the upper eyelid.

Chalazia are most common solitary but can occasionally be in multiple locations. Upon palpation they are often felt deep within the lid, whereas a stye is more superficial and typically centred over an eyelash. Pressure exerted on lids occasionally produces a toothpaste-like discharge from meibomian glands (as opposed to the normally oily and clear discharge).

Pathophysiology
Approximately 30 meibomian glands line the posterior surface of the tarsus, functioning mainly to provide the lipid component of the tear film. Such lipids provide a hydrophobic barrier to prevent evaporation and tears spilling over the cheek.

Most chalazia occur as a result of obstruction to a meibomian gland.[3] Following obstruction, the gland ruptures and releases its lipid products into surrounding eyelid soft tissue, triggering a lipogranulomatous reaction.[4] Pathologically the inflammatory response consists of neutrophils, plasma cells, lymphocytes, histiocytes, and giant cells in a zonal configuration around a central lipid material.[5] Early, inflammation appears as a suppurating granuloma, progressively evolving into a chronic mixed granulomatous inflammation and finally healing with the formation of granulation tissue and fibrosis.[5] A chalazion is both benign and sterile, although occasionally secondary infection may occur.[4]

Occasionally, obstruction of zeisian sebaceous glands can also produce a chalazion, which can often be distinguished clinically by its more superficial location. [5] A chalazion is distinct from a stye, which arises from an infected hair follicle on the lid margin and is characterized pathologically by an acute pyogenic inflammation with polymorphonuclear leukocytes and necrosis with pustule formation.

Management and Recommendations
A chalazion is most often a clinical diagnosis made relatively easily with a consistent history and exam. However, multiple benign, pre-malignant, as well as malignant conditions can mimic a chalazion.[1]

Apart from biopsy (which is not routine for a typical appearing lesion), no other diagnostic tests are used in identifying chalazia. Bacterial cultures are usually negative, although occasionally species such as Staphylococcus aureus, Staphylococcus albus, or Propionibacterium acnes may be isolated. Recently, research has been conducted into the possibility of using infrared photography to image and identify pathology in meibomian glands of the eyelid, although this technology has not yet been using in a clinical setting.

Acute chalazia are generally treated conservatively at first, as many resolve with or even without such measures (spontaneously resolution generally takes many months though). This involves warm wet compresses which help promote dilation and drainage of duct contents. Patients should be instructed to perform twice daily warm compresses (3-5 minutes) and massage with either fingers or cotton tips.[2] The massage should be directed over the lesion in the direction of the eyelashes, helping to promote the release of gland contents. Conservative treatment has a success rate of approximately 46%.[6] Incision and drainage is also necessary for persistent lesions.[6]

Follow-Up
All chalazia should be followed-up by an Optometrist or Ophthalmologist until resolution is noted. Failure to respond to treatment should raise suspicion of an alternative diagnosis, especially sebaceous cell carcinoma.

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Four Secrets to Earning Patient Loyalty (Because three is not enough and five is far too many)

Kevin Wilhelm, President of 4ECPs.

4ECPs is a business resource company for eye care professionals. Their divisions include a full-service marketing agency, an online job board, an e-learning training website, payment processing and social media solutions. Visit www.4ecps.com to learn more about the company.

[Full disclosure: When I sat down to write this article, I first titled it *Four Secrets to Winning Patient Loyalty*. Before submitting, I realized I had created the wrong title. *Winning*, to me, implies a degree of luck. Yes, you can win a race – but a true champion would rather say that they earned first place in the race. I knew I had to change the title to *Earning Patient Loyalty* because to do so requires strategy, commitment, hard work and dedication.]

As the world continues to evolve into an increasingly digital age, eye care practices are struggling to adapt to retain their patients. With the consolidated efforts of large chains and big box providers, the independent optometrist is left to compete against these giant retailers, many times without the tools required to make it a fair fight.

Patient acquisition is hard enough but getting a new patient in the door is only half the battle. Once they've become a patient, how do we keep them for life? How do we get them to tell their friends about us? How do we get them to spend more money with us? All of these questions should be considered when evaluating your overall patient experience at your practice.

Profitable growth in your practice can be sustained by *earning* patient loyalty. As alluded to above, earning loyalty is a long-term process which requires careful thought and complete buy-in from every member of your team. The vision starts at the top but needs to work it's way down to every stakeholder.

The following four steps outline key tactics that you can implement which will help you and your team earn loyalty from your patients, both in the short and long term.

SAVE THEM TIME

When your patients come into your office, do you know how much time they've allocated for their appointment? If you guessed 60 minutes, you would be correct. Typically, most people believe a medical appointment will take one hour. One way to lose patient loyalty is to keep your patients longer than the hour. Every minute past an hour it takes for your patients to stay in your office, the more frustrated they become. Every minute you save them, the more appreciative they will be.

Invest time and energy into your eye exam work flow. Think about all areas that can be organized more efficiently and ways to save your patients time and you'll start to shave off minutes here and there. Those precious minutes will not only increase the overall satisfaction of your patients visiting but you will also find that you can serve more patients each day and each patient will now have more time to spend in your dispensary, ultimately increasing the average patient value of your practice.

SAVE THEM HASSLE

There is a perception that online shopping reduces the level of stress and hassle shoppers face when purchasing their glasses. People believe that they are saving both time and money while enjoying a more *convenient* experience. If this is the perception, what can your practice implement to switch this narrative? Look at every opportunity to reduce the pain points of your patients and customers when they visit for an eye exam or come in to purchase a pair of glasses.

Specifically, what are some things that you can change right now to reduce the hassle that your patients potentially face? Confirmations and reminders on booked appointments is a good start. Comfortable wait rooms with activities for children is another. Make your patients want to visit your dispensary before, during and after their appointment by creating a desirable retail experience. For patients who have purchased new glasses, create incredible warranties and guarantees on your products – reduce their risk and hassle on buying faulty frames. Follow up with past patients just to check in (especially if you've given them an updated RX) – see how they're doing. Lastly, implementing direct billing for insurance claims is another great way to reduce patient hassle.

SHOW THEM SOMETHING NEW

Do you remember the adage *we learn something new every day*? Visiting an Optometrist is a great place to learn something amazing about one of the most useful organs in the human body – the eye. Explain to your patients about the types of exams they'll be going through and what specifically you are looking for. Show them the images and test results and really explain the overall health of their eyes. Capitalize on this great opportunity to teach them something they wouldn't know about their eyes and how they work – especially children. The more you can teach, the more appreciation your patients will have for the work that you do.

When your patients finish their exams and head into your dispensary, this is another great opportunity to show them new lines of frames or technology that exist in eye wear. Show them your exclusive brands or your most popular lines. Have your Opticians walk them through certain frames that they feel would look great on them or suit their lifestyle. People generally want to be shown new and exciting things and will give you their time if they feel it will benefit them.

DELIBERATELY EXCEED EXPECTATIONS

This is a fun one. Deliberately exceeding expectations is where you and your staff can design fun and creative ways to show both value and personality to your patients. To find effective ways to accomplish this, the first step is to write down the typical patient experience at another optometrist's practice. List all points of contact the patient will have. For example: practice website, phone call, hold music, voicemail message, exterior signage, interior entrance, music playing, reception greeting, waiting room décor, fragrance and aroma, etc. are all points of contact that your patients will have with your practice.

Once your list is created including all points of contact, brainstorm ways that you can enhance your patient experience at each point. Ask your team questions like: *How can we use the voicemail message to exceed expectations? How can we choose music that will exceed expectations?* Some of these ideas may be completely out of the box while others might include a small tweak to what is already working. If you invest the time and energy into deliberately finding ways to exceed expectations, you'll accomplish this goal in no time. Loyalty is built when businesses go above what they're supposed to do and provide a level of service that is unexpected.

Now that you're ready to implement these four steps to earn patient loyalty, the key is to be consistent. Consistency breeds excellence and consistent excellence is required to build a strong brand. Think of ways to be remarkable every day and find a way to implement it with every patient, at every point of contact.

Earning patient loyalty is a long-term process – it doesn't just happen overnight. It requires strategy, dedication, focus and a willingness to invest time and energy. Once you achieve high loyalty, the payoffs are well worth the effort. Just take it a step at a time. ●

Dealing with Renovations and Construction – for Optometry Tenants

Dale Willerton

Jeff Grandfield

Dale Willerton and Jeff Grandfield - *The Lease Coach are Commercial Lease Consultants who will work exclusively for tenants. Dale and Jeff are professional speakers and co-authors of Negotiating Commercial Leases & Renewals FOR DUMMIES (Wiley, 2013). Got a leasing question? Need help with your new lease or renewal? Call 1-800-738-9202, e-mail DaleWillerton@TheLeaseCoach.com or visit www.TheLeaseCoach.com.*

As an existing optometry tenant, you might want or need cosmetic upgrades to your commercial property. Even if you are looking at new carpeting or a fresh coat of paint in your clinic, one of the best times to address these plans with your landlord is prior to your lease renewal due date. Your landlord may be willing to cover the costs of these repairs or upgrades to your clinic as a means to motivate you to renew your lease and remain in his property as a rent-paying tenant. If you are considering relocating your practice, you may have to deal with many more substantial renovations or construction.

As we explain in our book, *Negotiating Commercial Leases & Renewals FOR DUMMIES,* there is more to consider and remember. Before completing any renovations or repairs to the property yourself, it's vital for optometry tenants to understand that landlords often reserve the right to pre-approve all design and construction to be done by the tenant for a couple of reasons:

- It's often the landlord's tenant allowance money being spent on those leasehold improvements. The landlord wants to ensure if at all possible that the improvements being made to the premises can live on and be used by the next tenant should you not stay for more than one lease term or your optometry business fails.

- It's the landlord's property and the landlord rightfully deserves to know whether your construction plans include penetrating a roof membrane or making other structural changes. If your design plans reveal that you'll be using a disproportionate amount of utilities, the landlord may also want some input on that (which is completely understandable).

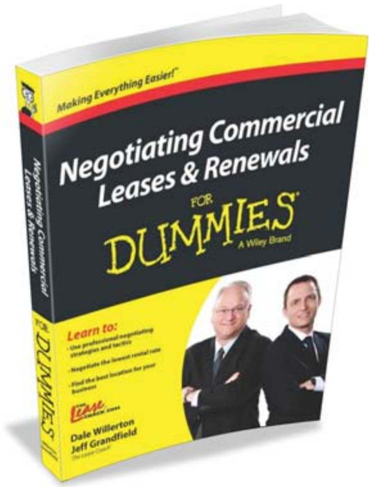
Furthermore, in some cases, the landlord may include a review fee for looking at and approving the tenant's plans. This review fee may not appear in the offer to lease but may instead come to light in the formal lease documents. As with many other terms and conditions in this agreement, this fee is completely negotiable. With one client, we remember that the landlord was trying to charge the tenant $1,500 to review their renovation plans ... The Lease Coach negotiated to eliminate this expense entirely as this was not a brand-new buildout and the plans were mostly cosmetic in nature.

We strongly advise that optometry tenants clarify the landlord's work to be done. The landlord's work, as listed in an offer to lease or formal lease renewal agreement, states very specifically any improvements that the landlord will do to the property – typically at the landlord's expense. One example can be the installation of a Heating, Ventilation, and Air-Conditioning (HVAC) unit on the property roof to provide warm and cool air inside. If the landlord is installing this for you, specify the unit's "capacity" (will it be sufficient to heat or cool your clinic?) and the "distribution" (the number and location of ducts inside your clinic). When it comes to HVAC systems and your lease renewal, you must consider the age of the unit, your history as a tenant (how long have you occupied the space?), and the person responsible for replacing the unit when the time comes. Many leases stipulate that HVAC replacement will be done at the tenant's cost; however, you can often negotiate for the landlord to replace the unit then or when it might fail in the future and to cover the expense as part of the lease renewal.

Optometry tenants may also choose to replace or upgrade their store flooring. In this case, the tenant should choose the preferred color and grade of flooring otherwise the landlord may simply install the cheapest and lowest-quality flooring available as a cost-cutting measure. No matter what the upgrade or renovation project desired or planned, it is critical for the tenant to include as many details as possible to avoid future disagreements and unforeseen costs. Do not make assumptions on these details.

Any work that the landlord isn't doing will be stated as tenant's work. Typically, this work is at your expense with the approval of the landlord. The more extensive the lease deal and the buildout, the more likely the list of landlord and tenant's work is included in a separate exhibit attached to the offer to lease, formal lease agreement, and/or the renewal/amending agreement as the case may be.

Some landlords are casual about what leasehold improvements the tenant plans for the commercial space. With a fairly conventional type of business, the tenant's work list may be relatively short. In your case, however, you may have more extensive requests. Make sure that you include all plumbing, electrical, air distribution, lighting, partition walls, and even window coverings because they are fixed or attached to the window sill. Make sure that you're prepared to complete all of the tenant's work on your list, or your landlord may force you to do it later. ●



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