

Screening for diabetic retinopathy

Do family physicians know the Canadian guidelines?

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ABSTRACT

OBJECTIVE To assess whether family physicians and family medicine residents know what the Canadian guidelines for screening for diabetic retinopathy are, and to assess whether they believe they can perform this screening.

DESIGN Mailed survey with two mailed reminders.

PARTICIPANTS All general practitioners (N = 1038) listed in two health catchment areas, Qu ebec and Chaudi ere-Appalaches administrative regions in the province of Qu ebec, and all family medicine residents (N = 125) at Laval University Medical School. Response rate was 62% among general practitioners and 77% among residents.

MAIN OUTCOME MEASURES Knowledge of screening guidelines for diabetic retinopathy in type I and type II diabetes, including timing of the initial screening examination, risk factors, natural history, and treatment of ocular complications; and perception of ability to screen for diabetic retinopathy.

RESULTS Among GPs, 80% of respondents correctly chose the statement with the current guideline for first screening for diabetic retinopathy to be performed shortly after diagnosis of type II diabetes. Only 13% of respondents were familiar with the guideline for first screening 5 years after diagnosis of type I diabetes. Agreement with other correct guideline statements was also low. Overall, residents had higher scores than GPs. Most respondents were not confident in the accuracy of their eye examinations.

CONCLUSION General practitioners and family medicine residents have varying levels of knowledge about the Canadian guidelines for screening for diabetic retinopathy. These results will be useful in designing and improving educational programs for GPs in diabetic retinopathy screening.

R ESUM E

OBJECTIF  valuer les connaissances des omnipraticiens et r esidents en m edecine familiale concernant les recommandations canadiennes sur le d epistage de la r etinopathie diab etique.  valuer la perception de l'abilit e   faire le d epistage chez ces professionnels de la sant e.

DEVIS Enqu ete postale avec deux rappels.

PARTICIPANTS Tous les omnipraticiens (N = 1038) des r egions administratives de Qu ebec et Chaudi ere-Appalaches et tous les r esidents en m edecine familiale (N = 125) de la Facult e de m edecine de l'Universit e Laval. Des taux de r eponse   l'enqu ete de 62% ont  t  obtenus chez les omnipraticiens et de 77% chez les r esidents.

PRINCIPALES MESURES DES R ESULTATS Connaissances des recommandations pour le d epistage de la r etinopathie diab etique chez les diab etiques de type I et II quant au moment de l'examen initial de d epistage, aux facteurs de risque,   l'histoire naturelle et au traitement des complications oculaires de la r etinopathie diab etique; perceptions de leur aptitude   faire le d epistage.

R ESULTATS Parmi les omnipraticiens, 80% ont choisi correctement l' nonc e de la recommandation d'un examen r etinienn de d epistage le plus t ot possible apr es le diagnostic d'un diab ete de type II. Par contre seulement 13% des r epondants ont choisi correctement l' nonc e de la recommandation d'un examen initial de d epistage 5 ans apr es le diagnostic d'un diab ete de type I. Les taux d'accord avec les autres  nonc es  taient  galement faibles. En g en eral, les r esidents ont obtenu des scores sup erieurs   ceux des omnipraticiens. Les r epondants se disaient peu confiants de l'exactitude de leur examen du fond d'oeil.

CONCLUSION Le niveau de connaissance des omnipraticiens et r esidents en m edecine familiale concernant les recommandations canadiennes sur le d epistage de la r etinopathie diab etique est variable. Les donn ees de cette  tude seront utiles pour concevoir et am eliorer les programmes de formation sur le d epistage de la r etinopathie diab etique par les omnipraticiens.

This article has been peer reviewed.

Cet article a fait l'objet d'une  valuation externe.

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Screening for diabetic retinopathy

Diabetic retinopathy is one of the most serious complications of diabetes mellitus. In North America, it is the leading cause of new cases of blindness among people aged 25 to 74 years.¹ The prevalence of retinopathy varies with the type and duration of diabetes.^{2,3} After 15 years with diabetes, nearly all insulin-dependent diabetics (type I) and more than 75% of non-insulin-dependent diabetics (type II) have some retinopathy.

Although proliferative diabetic retinopathy is not seen during the first 5 years of type I diabetes, about 2% of type II diabetics already have proliferative diabetic retinopathy at time of diagnosis. Macular edema resulting from diabetic retinopathy is also an important cause of visual impairment among diabetic patients.^{4,5}

Laser photocoagulation of the retina is currently the treatment of choice for both proliferative diabetic retinopathy and macular edema, and several well-designed randomized clinical trials have demonstrated that it helps prevent blindness.^{6,9} Photocoagulation performed before serious visual impairment reduces by half the risk of severe visual loss from both proliferative diabetic retinopathy and macular edema. Diabetic retinopathy frequently occurs without visual symptoms; symptoms sometimes do not appear until some degree of visual loss is irreversible.⁷⁻¹⁰

The Canadian Diabetes Advisory Board developed screening guidelines for diabetic retinopathy (Table 1).¹¹ These guidelines are part of the clinical practice guidelines for treatment of diabetes mellitus developed by an expert committee composed of 25 members, including GPs. The guidelines were reviewed by 38 additional health professionals and were presented at a public consensus conference in 1991 before they were published. Guidelines developed by the American College of Physicians, the American Diabetes Association, and the American Academy of Ophthalmology are almost identical to the Canadian guidelines.¹²

Several studies of diabetic populations suggest that diabetic patients do not receive the recommended eye

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care to detect and treat retinopathy.¹³⁻¹⁵ In a preliminary study performed at the Laval University Medical Centre, we calculated an average of 7 years from time of diagnosis of type II diabetes to time of first screening examination for diabetic retinopathy. This situation can be explained by many factors, including patient noncompliance, insufficient ophthalmologic resources, and family practitioners' lack of knowledge of the guidelines. The main goal of this survey was to assess how much GPs and family medicine residents know about the Canadian guidelines for screening for diabetic retinopathy.

METHODS

Site

In the Québec and Chaudière-Appalaches administrative regions of the province of Québec, four ophthalmologists provide laser photocoagulation treatments for diabetic retinopathy.

Participants

Two populations were chosen for the survey: all GPs (N = 1038) from the two health catchment areas, as listed by the Fédération des Médecins Omnipraticiens du Québec in 1992, who were practising general medicine; and all residents (N = 125) registered in Laval University's family medicine program in 1992-1993, as listed by Laval's Department of Family Medicine.

Survey

The survey was approved by the Laval University Medical Centre and Laval University Ethics Committees. It was conducted by mail, using two reminders, as described by Dillman.¹⁶ After the first mailing, participants were allowed 8 weeks to return the questionnaire. Complete confidentiality was ensured. Individual identification numbers were used for mailing purposes only, so that follow-up mailings would be sent only to nonrespondents. Physicians were informed about the identification numbers and their purpose. Only one respondent showed reluctance to accept this procedure by scraping the identification number off the return envelope.

Questionnaire

A closed-ended questionnaire was designed in French by a multidisciplinary group that included GPs. It was based on the Canadian Diabetes Advisory Board's guidelines.¹¹ This group agreed that three topics should be assessed: knowledge of current

guidelines on the timing of initial screening for diabetic retinopathy and of subsequent screening examinations; awareness that proliferative diabetic retinopathy and macular edema can appear without symptoms; and awareness that laser photocoagulation is effective in preventing or slowing visual loss from diabetic retinopathy and that improvement in vision is uncommon after photocoagulation.

The questionnaire had 17 multiple-choice questions based on the identified topics and another set of questions to collect demographic data. The questionnaire was pretested on family medicine residents at Sherbrooke University. Time required to complete the questionnaire was estimated at 10 to 15 minutes.

Data analyses

Knowledge of guidelines was measured by calculating the proportion of respondents who agreed with a specific statement on the questionnaire.

RESULTS

Response rates

Of the 1038 questionnaires mailed to GPs, 648 were returned, yielding a response rate of 62%. Three partially completed questionnaires were excluded, leaving 645 questionnaires suitable for analysis. Of the 125 residents in family medicine, 96 returned questionnaires, yielding a response rate of 77%.

Participant characteristics

Demographic and practice characteristics of participating GPs are summarized in **Table 2**. More than one third were women; mean age was 41 years. Respondents could not be compared with nonrespondents because participants were not identified. Data on all GPs surveyed were available, however, from the Régie de l'assurance maladie du Québec database (**Table 2**). Respondents differed from the total population surveyed only by practice type (fewer participants worked in general care hospitals). Of the residents who responded, almost two thirds were women and the mean age was 28 years.

Close to half the GP respondents were involved in follow up of type I and II diabetics in their practices; 38% were involved only in follow up of type II diabetics, and 13% did not follow any diabetics (data not shown). These physicians estimated that during 2 weeks they would see an average of seven type II diabetics and that they followed an average of four type I diabetics regularly in their practices. Among responding residents, only 19% were involved in follow up of both type

Table 1. Diabetic retinopathy screening guidelines developed by the Canadian Diabetes Advisory Board¹¹

PATIENT PROFILE	SCREENING RECOMMENDATIONS
Type I (juvenile onset) diabetes	Annually beginning 5 years after onset of diabetes
Type II (adult onset) diabetes	Shortly after diagnosis of diabetes and repeated yearly
Women with diabetes who become pregnant	Comprehensive eye examination in first trimester and close follow up throughout pregnancy
People with macular edema, moderate to severe nonproliferative retinopathy, or any proliferative retinopathy	Prompt referral to an ophthalmologist

Table 2. Characteristics of respondent GPs compared with total population of GPs

CHARACTERISTICS	RESPONDENTS (N = 645)	TOTAL POPULATION* (N = 1132)
Sex, proportion of men	64.3%	66.8%
Mean age, years	41.0	42.4
Mean no. of years in practice	14.9	15.4
Location, proportion of urban	73.3%	—
Type of training		
• Multidisciplinary internship	61.9% [†]	—
• Residency in family medicine	33.8%	—
• Other	3.0%	—
Practice type		
• Private	54.7% [†]	57.5% [†]
• Family medicine unit	7.0%	—
• Community clinic (CLSC)	9.9%	8.1%
• General care hospital	14.3%	32.3%
• Extended care hospital	0.3%	0.2%
• Nursing home	1.9%	1.7%
• Housecalls	0.3%	—
• Other	3.0%	0.2%
Mean no. of working hours weekly	42.6	—
Mean no. of working hours devoted to patients weekly	36.6	—

*Data obtained from the Régie de l'assurance maladie du Québec (1991-1992).

[†]Because of missing data, some percentages do not add up to 100.

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Table 3. Questions and responses on time of first screening examination for diabetic retinopathy: Correct answers are in italics.

QUESTION AND RESPONSES	GENERAL PRACTITIONERS (N = 645) N (%)	RESIDENTS (N = 96) N (%)
When should you perform a first screening examination for diabetic retinopathy in type I diabetes?		
• <i>Shortly after diagnosis of diabetes</i>	520 (80.6)	35 (36.5)
• <i>Five years after onset of diabetes</i>	81 (12.6)	58 (60.4)
• Only when there are visual signs or symptoms, regardless of time of diagnosis	5 (0.8)	0
• Other	3 (0.5)	1 (1.0)
• I do not know	19 (2.9)	1 (1.0)
• Missing data	17 (2.6)	1 (1.0)
When should you perform a first screening examination for diabetic retinopathy in type II diabetes?		
• <i>Shortly after diagnosis of diabetes</i>	516 (80.0)	88 (91.7)
• Five years after onset of diabetes	51 (7.9)	3 (3.1)
• Only when there are visual signs or symptoms, regardless of time of diagnosis	27 (4.2)	
• Other	17 (2.6)	3 (3.1)
• I do not know	19 (2.9)	1 (1.0)
• Missing data	15 (2.3)	1 (1.0)

I and II diabetics, while 46% followed only type II diabetics and 34% did not follow any diabetic patients. During 2 weeks, residents met on average two type II diabetics and fewer than one type I diabetic.

Knowledge of screening guidelines

For type I diabetes, 13% of GPs and 60% of residents knew that the initial screening eye examination for diabetic retinopathy should be done 5 years after onset of diabetes ($\chi^2 P < .0001$, comparing the proportion of correct answers of GPs and residents) (Table 3). For type II diabetes, 80% of GPs and 92% of residents knew that the initial screening examination should be done shortly after diagnosis ($\chi^2 P = .006$).

We found that 44% of GPs and 58% of residents knew that diabetic women who become pregnant should be screened for diabetic retinopathy during the first trimester and closely followed throughout pregnancy ($\chi^2 P = .01$) (Table 4). Only one third of respondents knew that macular edema could appear without symptoms, but many respondents knew that diabetic retinopathy could appear without symptoms. Nearly one third of practitioners (27%) held the misconception that laser photocoagulation generally allows for improvement of visual acuity, and 38% did not know one way or the other (data not shown).

Level of knowledge of guideline statements was consistently higher among residents than among GPs (Table 4). Although GPs trained through family

medicine residency programs often had more correct answers than those trained through internships, the odds ratio of correct answers adjusted for age, sex, clinical experience (years), number of working hours per week, number of working hours devoted to patients per week, and type of practice were not statistically different (data not shown).

Perception of retinopathy screening ability

Seventy percent of GPs did not feel competent to screen for diabetic retinopathy compared with 78% of residents ($\chi^2 P = .09$). Asked to describe how often they performed a fundus examination of the retina in their practices, 20% answered they never did, 37% said less than once a month, 23% said between once a month and once a week, and only 5% said more than once a week. Respondents felt slightly (33%) to moderately (21%) confident about the accuracy of their eye examinations for screening for diabetic retinopathy; 10% did not feel confident at all, but 2% felt highly confident.

DISCUSSION

Overall survey response rates of 62% among GPs and 77% among residents compare favourably with response rates obtained in similar surveys.¹⁷ Respondents to our survey were not found to differ significantly from the total GP population with regard

Table 4. No. of GPs and residents responding correctly to statements about screening and treatment for diabetic retinopathy (DR)

STATEMENT	CORRECT RESPONSE*	GENERAL PRACTITIONERS (N = 645) N (%)	RESIDENTS (N = 96) N (%)	χ ² P VALUE
Diabetic women who become pregnant should be screened for DR in the first trimester and be closely followed throughout pregnancy	Agree	286 (44.3)	56 (58.3)	.01
Type II diabetic patients with persistently elevated glucose levels or proteinuria should have a yearly screening examination for DR	Agree	585 (90.7)	92 (95.8)	.09
Eye complications are frequent in the first 5 years after onset of type I diabetes	Disagree	141 (21.9)	57 (59.4)	<.0001
Eye complications are frequent in the first 5 years after onset of type II diabetes	Agree	282 (43.7)	69 (71.9)	<.0001
In type I and type II diabetes, DR can appear without visual symptoms	Agree	495 (76.7)	83 (86.5)	.03
In type I and type II diabetes, macular edema can appear without visual symptoms	Agree	226 (35.0)	31 (32.3)	.6
Laser photocoagulation of the retina is indicated for proliferative DR	Agree	473 (73.3)	86 (89.6)	.0006
Laser photocoagulation of the retina is indicated for diabetic macular edema	Agree	70 (10.9)	6 (6.3)	.17
Laser photocoagulation generally helps prevent visual loss	Agree	447 (69.3)	70 (72.9)	.47
Laser photocoagulation generally helps improve visual acuity	Disagree	225 (34.9)	63 (65.6)	<.0001

* Choices were agree, disagree, and do not know.

to sex, age, or duration of practice, although they differed slightly as to type of practice. This comparison must be interpreted with caution, however. The fact that no difference was found between the two groups in certain demographic characteristics does not exclude the possibility that differences exist in level of knowledge between respondents and nonrespondents. For instance, respondents to mailed surveys might be more knowledgeable than nonrespondents and, therefore, might be more likely to demonstrate standard practice patterns. Consequently, the results of this survey might show an overly optimistic proportion of correct answers.

Little knowledge of certain guidelines

Results of this survey suggest a low level of knowledge of certain practice guidelines for screening for diabetic retinopathy. Among GPs, 13% of respondents knew the current screening recommendation for

type I diabetics, but 80% knew it for type II diabetics. The fact that a high proportion of GPs thought they should screen both type I and II diabetics shortly after diagnosis of diabetes might be explained by the GPs' conservative attitudes.

A recent study showed that Canadian physicians, although generally positive about guidelines and confident in those developed by clinicians, have not yet integrated use of guidelines into their practices to a large extent.¹⁸ By referring type I diabetics early to ophthalmologists, GPs might also be trying to make the point that diabetic retinopathy screening is important—with a view to improving future compliance with screening. Forty-four percent of physicians responded correctly to the screening guideline on diabetic women who become pregnant. A prospective controlled study showed that pregnancy increases the risk that retinopathy will progress in type I diabetic women.¹⁹

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Key points

- Family physicians were unfamiliar with some aspects of screening for diabetic retinopathy.
- Most important was the fact that macular edema due to diabetes can lead to visual loss, but can only be diagnosed by an ophthalmologist's examination.
- Because photocoagulation can prevent visual loss, proper screening could lead to improved quality of life for diabetic patients.

Our results show that many residents rarely follow up diabetics and that they do not feel competent to screen for diabetic retinopathy. Knowledge of screening guidelines was nonetheless consistently higher among residents than among GPs. Other investigators have shown that young family physicians have more theoretical knowledge than their elders.²⁰ Most practitioners in this study were trained through internships (1 year of training) rather than family medicine residency (2 years). Our study population size did not allow us to conclude that type of training and level of knowledge were associated.

Few follow current guidelines

It is doubtful that current guidelines for diabetic retinopathy screening are being followed widely in the general practices surveyed for this study. Reasons for this include insufficient ophthalmologic resources, lack of patient compliance, lack of knowledge about diabetic retinopathy screening, lack of confidence in ability to screen for diabetic retinopathy, and socioeconomic factors. This paper did not address the clinical ability to assess a diabetic's retina. Sussman and associates²¹ indicated that physicians other than ophthalmologists examining fundi under ideal circumstances (dilated pupils in darkened rooms) miss 50% of treatable retinopathy while ophthalmologists miss only 4%.

Conclusion

Diabetic retinopathy is the main cause of visual impairment among diabetics⁴ and the leading cause of blindness in adults.¹ This visual loss is preventable in part by adequate screening and laser photocoagulation therapy when indicated.^{6,7} It should be emphasized that reducing loss of vision among diabetics rests in a comprehensive approach to comanagement of diabetic patients by GPs; screening services such as those provided by general ophthalmologists,

optometrists, or fundus photography services; and ophthalmologists providing laser photocoagulation treatments. Our results emphasize the need for educational programs on eye care issues for diabetics. Training GPs in this area could improve the comprehensive health care of diabetic patients. ✦

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