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Diabetic retinopathy

Screening and management by Australian GPs

Aim

To describe current diabetic retinopathy (DR) screening and management practices among Australian general practitioners.

Method

A self administered questionnaire on DR management was mailed to 2000 rural and urban GPs across Australia in 2007–2008.

Results

Only 29% of the GP respondents had read the National Health and Research Council guidelines at least once and 41% had a 'moderate' to 'strong' desire to screen for DR. A majority of GPs (74%) reported not routinely examining their diabetic patients for DR. Lack of confidence in detecting DR changes (86.4%) and time constraints (73.4%) were the two major barriers to GPs performing dilated funduscopy on diabetic patients.

Discussion

Given that access to optometry is not evenly distributed across the country, and that ophthalmology is under-resourced, GPs are the healthcare providers most able to manage and screen for DR in the community.

Keywords: diabetes mellitus; diabetic retinopathy; mass screening; secondary prevention; general practice

Diabetes mellitus is rising in prevalence within Australia and internationally, with estimates indicating that the global prevalence of diabetes will double by 2030.¹ In Australia, the prevalence of diabetes is 8% in adult men and 6.5% in adult women;² of these, one in four will be diagnosed with diabetic retinopathy (DR).³ Early detection and prompt treatment can prevent 98% of visual impairment.⁴

Primary healthcare providers such as general practitioners and optometrists are at the 'front line' of service provision and play a crucial role in screening for DR in the community. However, a 1994 survey of Victorian GPs found over half had little interest in DR screening and that most routinely examined less than half of their patients with diabetes for DR.⁵ The National Health and Medical Research Council (NHMRC) released clinical practice guidelines for DR in 1997,⁶ outlining evidence based DR management practices and encouraging physicians to increase the DR screening rate in order to reduce DR related visual impairment. Nonetheless, a subsequent Victorian survey reported that despite the NHMRC guidelines, 48% of GPs still had little or no desire to screen for DR.⁷

This study is the first national survey of Australian GPs on DR management. The purpose is to investigate current Australian GPs' management practices and attitudes towards DR and its management since the release of the 1997 NHMRC guidelines. Given the survey was started in late 2007, it can also serve as a baseline before the release of the most recent NHMRC guidelines in 2008.⁸

Method

A random sample of 2000 currently practising Australian GPs selected from The Royal Australian College of General Practitioners' (RACGP) membership database were surveyed. A package consisting of a self administered two page questionnaire, an information leaflet detailing the aim of the study and a reply paid return envelope was posted to selected GPs in December 2007. A repeat mailout of surveys to nonresponders was conducted after 3 months to maximise response.

This study was approved by the University of Western Australia's Human Research Ethics Committee.

The survey questions related to:

- general professional and practice details (eg. location of previous training, duration at and location of practices, rural or metropolitan practice)
- frequency of measurement of HbA1c, blood pressure, cholesterol, smoking status
- perceived barriers to DR screening (eg. time factors, patient refusal, fear of angle closure glaucoma, lack of confidence in detecting and managing DR and lack of dilating drops and ophthalmoscopes in practices)
- frequency of referral of diabetic patients to optometrists and ophthalmologists for DR screening
- eye examination routine (measurement of visual acuity, dilated or nondilated funduscopy)
- GPs' desire to undertake DR screening.

The participants were also asked to respond to five case scenarios regarding the management of DR clinical signs: microaneurysms, retinal haemorrhages, cottonwool spots, new vessel formation and presence of hard exudates near

the macula. A further seven hypothetical case scenarios involving patients that varied in age (7, 18 and 60 years of age), diabetic management (diet control, oral hypoglycaemic agents and insulin) and glycaemic control (poorly and well controlled) who had no signs of DR detected at baseline examination were also included.

Analyses were performed using SPSS version 17 (SPSS, Chicago, IL, USA). Descriptive statistics (mean, standard deviation) were calculated for continuous variables. Relationships between categorical variables were explored using chi-square tests. Additionally, a multivariate logistic regression model was used to study the possible factors relating to GPs' confidence in detecting DR clinical signs, such as their years in practice, previous training location and whether or not they had read the NHMRC guidelines.

Results

There were 429 (21%) respondents to the survey (*Table 1*). Almost half reported having received the 1997 NHMRC guidelines for DR management, however, of these only 29% had read the guidelines at least once. Apart from the NHMRC guidelines, GPs also reported using other resources such as RACGP guidelines,⁹ *Therapeutic guidelines: endocrinology*,¹⁰ National Prescribing Service Guidelines,¹¹ American Diabetic Association Guidelines,¹² various online websites, and diabetes focused peer reviewed journals.

All GPs reviewed their diabetic patients' blood pressure (98.6%) and HbA1c (92.1%) at least every 6 months (*Table 2*). Assessment of lipid profile, smoking status and advice on diabetes complications were conducted less frequently by the respondent GPs (*Table 2*). Nearly 75% of GPs did not routinely examine their diabetic patients for DR; of those, 89% would refer their diabetic patients to see an ophthalmologist within 2 years of initial diabetes diagnosis. More GPs 'usually' and 'always' performed nondilated (61%) than dilated funduscopy (13%) to detect DR signs and only 65% of GPs 'usually' or 'always' checked visual acuity.

Only 21% of GPs responded that they were 'often' or 'almost always' confident in detecting DR changes. Lack of confidence in detecting

Table 1. Demographics of GP respondents

Demographic information	Total (%)	Australian GPs (%) ²⁰
State or territory of practice		
New South Wales	101 (24%)	33.4
Victoria	122 (29%)	25.0
Queensland	74 (18%)	19.1
Western Australia	68 (16%)	9.2
South Australia	40 (9%)	8.5
Tasmania	11 (3%)	2.7
Australian Capital Territory	5 (1%)	1.5
Northern Territory	1 (<1%)	0.7
Years of practice		
0–10 years	47 (11%)	No comparison available
11–20 years	61 (14%)	
21–30 years	136 (32%)	
>30 years	185 (43%)	
Locality of practice		
Metropolitan	279 (66%)	73.8
Rural	143 (34%)	26.2
Location of training		
Australia	343 (81%)	68.4
United Kingdom	39 (9%)	–
India	12 (3%)	–
New Zealand	6 (1%)	–
Other	26 (6%)	Overseas 31.6
Note: Not all respondents answered all questions, so not all numbers total to the 429 respondents		

DR changes (86%) and time constraints (73%) were the primary barriers to performing dilated funduscopy on diabetic patients for GPs. Additional reported barriers included patient refusal, concern of angle closure glaucoma, lack of dilating drops and uncertainty surrounding DR management (*Table 3*).

Less than half of GPs (41%) expressed 'moderate' to 'strong' desire to screen for DR in the community setting. Nearly all GPs (91%) referred diabetic patients to ophthalmologists every 1–2 years, while 68% referred their diabetic patients to optometrists in the first instance. One-fifth of GPs never referred any diabetic patients to see an optometrist, these GPs all preferred to refer their patients to see an ophthalmologist every 1–2 years. A small number of GPs (8%) would only refer their patients

to an ophthalmologist or optometrist if visual symptoms were present. Nearly 80% of GPs felt their patients would see an ophthalmologist should it be necessary.

Table 4 shows responses to the management of specific DR signs and hypothetical case scenarios. Most GPs (63%) would refer their patients with occasional microaneurysms with normal vision within 1 month to see an ophthalmologist while only 3% were confident to not refer these patients to the ophthalmologist. For patients with hard exudates near the macula and normal vision, 87% of GPs indicated that they would refer to an ophthalmologist within 1 month. Following the detection of peripheral microaneurysms and retinal haemorrhages, 95% of GPs would refer their patients to see an ophthalmologist within the recommended

Table 2. Current GP management and attitudes to diabetes and diabetic retinopathy

At diabetes follow up	Never and rarely (%)	Sometimes (%)	Usually and always (%)
Visual acuity measurement	30 (13.5%)	49 (22%)	144 (64.5%)
Fundoscopy (undilated)	54 (25.1%)	29 (13.5%)	132 (61.4%)
Dilated fundoscopy	155 (79.0%)	16 (8.2%)	25 (12.8%)
Diabetic patients examined for diabetic retinopathy	None 197 (46.4%)	Some 119 (28%)	All 109 (25.6%)
Frequency with which diabetic patients were reviewed	Yearly or less 137 (57.3%)	More than yearly 102 (42.7%)	–
Frequency of risk factor management	Six monthly or less	More than 6 monthly	–
HbA1c	387 (92.1%)	33 (7.9%)	–
Blood pressure	416 (98.6%)	6 (1.4%)	–
Cholesterol	245 (58.2%)	176 (41.8%)	–
Smoking	278 (65.9%)	144 (34.1%)	–
Advice regarding complications	334 (79.7%)	85 (20.3%)	–

Note: Not all respondents answered all questions, so not all numbers total to the 429 respondents

timeframe. For new vessel formation, nearly all GPs would refer within 1 month to an ophthalmologist.

A majority of GPs (82%) would (inappropriately) refer a child, 7 years of age, with diabetes and no signs of DR for regular eye screening while 18% would refer such patients in 5 years. As shown in *Table 3*, the majority of the GPs would refer patients of various ages (7, 18 and 60 years); diabetic management (diet control, oral hypoglycaemic and insulin); and glycaemic control (well and poorly controlled) elsewhere for regular eye screening even without any signs of DR rather than perform the review themselves.

General practitioners' desire to screen for DR in the community was strongly associated with having read the 1997 NHMRC guidelines at least once ($\chi^2=17.64$, $p<0.001$) and with reporting confidence in detecting DR clinical changes ($\chi^2=28.5$, $p<0.001$). In multivariate logistic regression analyses, GPs who reported confidence in detecting DR clinical signs were 3.31 times more likely to have a desire to screen for DR – after controlling for reading the guidelines at least once, years of practice and previous training location (OR=3.31, SE=0.85, 95% CI: 2.00–5.47, $p<0.001$). However, the frequency of GPs performing visual acuity measurement and dilated fundoscopy as part of the routine eye examination for patients with diabetes was not associated with reading the NHMRC guidelines.

General practitioners' confidence in detecting DR changes was strongly associated with:

- GPs having read the guidelines at least once ($\chi^2=7.48$, $p<0.01$)
- GPs having been in practice for more than 15 years ($\chi^2=7.71$, $p<0.01$)
- being an Australian trained GP ($\chi^2=3.88$, $p<0.05$).

When controlled for years of practice and previous training location, GPs who had read the guidelines at least once were 2.11 times more likely to report confidence in screening for DR (OR=2.11, SE=0.54, 95% CI: 1.27–3.50, $p<0.005$). The location of the GP practice (rural or metropolitan) was not associated with reported confidence in detecting DR changes, desire of DR screening or the frequency of referral to ophthalmologists or optometrists.

Discussion

In response to the World Health Assembly resolution on the elimination of avoidable blindness, the National Eye Health Framework was developed following the Australian Health Ministers' Conference in 2005.¹³ It identified five potential key areas which may help prevent avoidable blindness and low vision. Two of these related to increasing early detection and improving access to eye healthcare services.¹³ At the time of the release of the NHMRC guidelines on DR management in 1997,⁶ the Victorian GP DR survey showed that half of GPs expressed a desire to regularly screen for DR in patients attending their practice.⁷ Unfortunately, the authors found that since the last survey, even fewer GPs (41%) expressed a desire to screen

Table 3. Barriers to GPs performing dilated fundoscopy

Barrier	No barrier or minor barrier (%)	Moderate or major barrier (%)
No confidence in detecting diabetic retinopathy signs	55 (13.6%)	349 (86.4%)
Time consuming	109 (26.7%)	300 (73.3%)
Patients' refusal to dilation	145 (36.5%)	252 (63.5%)
Worry of inducing angle closure glaucoma	223 (55.8%)	177 (44.2%)
Lack of dilating drops	251 (62.4%)	151 (37.6%)
Unsure of diabetic retinopathy management	328 (82.2%)	71 (17.8%)
Lack of ophthalmoscopes	396 (97.8%)	9 (2.2%)

Note: Not all respondents answered all questions, so not all numbers total to the 429 respondents

Table 4. GP management of hypothetical clinical scenarios and specific signs of diabetic retinopathy

Clinical scenario	Appropriate referral (%)	Inappropriate referral (%)	Recommended referral time frame (2008)*	Recommended referral time frame (1997)**
Occasional microaneurysms with normal vision	101 (24.7%)	308 (75.3%)	1 year	Nonurgent, routine referral
Hard exudates near macula with normal vision	348 (86.6%)	54 (13.4%)	1 month or less	Refer urgently
Peripheral microaneurysms and retinal haemorrhages	384 (94.8%)	21 (5.2%)	6 months or less	Refer urgently
Extensive microaneurysms, retinal haemorrhages and cottonwool spots (all peripherally)	407 (99.5%)	2 (0.5%)	3 months or less	Refer urgently
New vessel formation	407 (99.8%)	1 (0.2%)	1 month or less	Refer urgently
If no signs of DR at baseline examination				
7 year old – newly diagnosed diabetic	338 (80.3%)	83 (19.7%)	At puberty	Refer in 5 years
18 year old – newly diagnosed diabetic [†]	351 (84.0%)	67 (16.0%)	1 to 2 years	Yearly, no later than 2 yearly
60 year old with good HbA1c control – diet [#]	284 (67.1%)	139 (32.9%)	2 years	Yearly, no later than 2 yearly
60 year old, 10 years diabetes, commenced on OHA [†]	361 (84.9%)	64 (15.1%)	1 to 2 years	Yearly, no later than 2 yearly
60 year old, 10 years diabetes with good HbA1c on OHA [#]	289 (68.5%)	133 (31.5%)	2 years	Yearly, no later than 2 yearly
60 year old, 10 years diabetes with good HbA1c on insulin [#]	269 (63.4%)	155 (36.6%)	2 years	Yearly, no later than 2 yearly
60 year old, poorly controlled HbA1c despite insulin	306 (72.0%)	119 (28.0%)	1 year	Yearly, no later than 2 yearly
* Referral time frame recommended by 2008 NHMRC guidelines ⁸				
** Referral time frame recommended by 1997 NHMRC guidelines ⁶				
[†] Should HbA1c is unavailable, all diabetic patients should be referred within 1–2 years				
[#] Patients with good HbA1c control and no signs of DR are recommended to undergo 2 yearly fundus examination for DR				
OHA = oral hypoglycaemic agents; HbA1c = glycosylated haemoglobin				
Note: Not all respondents answered all questions, so not all numbers total to the 429 respondents				

for DR. This is of concern given that primary healthcare screening provides an excellent opportunity to differentiate those patients who require specialist ophthalmic care from those who can continue to be managed by their GP.

We also found that similar to the previous Victorian study,⁷ GPs' perceived the lack of confidence in detecting clinical DR signs was the leading barrier to performing dilated funduscopy. A fear of inducing angle closure glaucoma (a rare 1:20 000 event postdilation)¹⁴ was perceived as another major barrier to performing dilated funduscopy. Despite the low numbers of GPs who reported confidence in detecting DR clinical signs (21%), based on the hypothetical clinical scenarios in the survey most GPs were generally confident and proficient to manage DR once DR changes were detected. Given that the GPs who reported confidence in detecting DR clinical signs were three times more likely to have strong desire to screen for DR, more education needs to be directed toward detection of DR clinical signs to

increase the DR screening rate in the Australian community.

In this study, a great proportion of GPs (92%) reported that they review their patients' HbA1c every 6 months or less. Nonetheless, numerous previous data based on Medicare data analysis showed that only 25–80% of GPs measured their patients' HbA1c level at a 6 monthly interval.¹⁵ This highlighted a gap between what GPs think they should do as opposed to what is done in reality on a routine basis. (However, those who completed the survey may have been more motivated to measure HbA1c than others.) Given that good HbA1c control significantly reduces the risk of microvascular and macrovascular complications,^{16–17} it is important to translate theoretical knowledge on diabetes management into routine clinical practices by checking their patients' HbA1c every 6 months as per NHMRC guidelines.⁸

In a similar survey of optometrists, the authors found that the optometric DR management was generally inferior to that of

GPs.¹⁸ Nearly 60% of optometrists would not refer patients with diabetic maculopathy to see an ophthalmologist and 10% would not refer patients with severe nonproliferative DR. Comparing these two surveys suggests that GPs may be the most proficient healthcare providers to manage and screen for DR in the community.

From the 2009 study on optometrists,¹⁸ the retinal cameras were shown to have increased optometrists' confidence to detect DR changes such as microaneurysms, retinal haemorrhages, new vessel formation and macular oedema. It is unknown whether GPs would feel more confident with retinal photographic screening, however, a pilot study of photographic screening by GPs for DR found that they would be willing to expand their roles into DR screening if such infrastructure were readily accessible.¹⁹ The study¹⁹ also showed that GPs had good diagnostic accuracy (sensitivity 87%; specificity 95%) for DR. Given that this was a pilot study with a relatively small sample size, a larger study using cheaper, portable retinal cameras

would provide more insight into the enthusiasm for, and effectiveness of, retinal photographic screening in primary care.

The updated 2008 NHMRC guidelines suggest that mydriatic retinal photography is the most effective DR screening tool with a sensitivity of at least 80%.⁸ Cheaper retinal cameras are now available and should be encouraged in primary healthcare, especially for large practices. Retinal photographs taken by staff could be instantly interpreted by the GP to determine the need for referrals to ophthalmologists during general diabetes consultations.

The strength of this study is that it is the first nationwide GP DR survey. The study findings not only revealed the current management practices of Australian GPs on DR management but can be utilised as baseline findings for a future study to assess the impact of the 2008 NHMRC guidelines.⁸ Additionally, the GPs' demographics from this study, such as the distribution of respondent GPs and locality of practices, were comparable to the national demographics for GPs (age and gender were not enquired about in this survey).²⁰ On the other hand, the study findings were limited by several factors. Of the GPs practising in Australia (n=12 938), this study had a relatively small sample size (3.3%, n=429) which may affect the generalisability of results.²⁰ In addition, the study did not gather data regarding current use of retinal cameras among GPs, their previous education on eye training and the size of their practice, which could affect GPs' confidence in screening for DR.

Conclusion

In conclusion, Australian GPs in general reported sound management of sight threatening DR. Given that the access to optometry is not evenly distributed across Australia and that ophthalmology is under-resourced, GPs may be the most proficient healthcare providers to manage and screen for DR in the community. In the absence of retinal photography, dilated ophthalmoscopy is still the most convenient and effective method to examine for DR and therefore, it is a basic clinical examination skill that should be encouraged for all GPs.

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