Diabetic retinopathy screening for specialist care

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KEY MESSAGES

1. The weighted prevalence of diabetic retinopathy (DR) and sight-threatening diabetic retinopathy (STDR) among subjects was 41.8% and 10.4%, respectively.
2. Around 20% of subjects with diabetes who attended the studied hospital reported not having been offered DR screening before. The others had been offered it by the hospital diabetic clinic (41.0%, 431/1051), a general outpatient clinic (GOPC, 13.7%, 144/1051), the hospital ophthalmology department (8.4%, 88/1051) or the hospital family medicine clinic (8.4%, 88/1051).
3. Subjects attending the renal clinic and the cardiac clinic were less likely to be offered DR screening (renal: OR=0.48, P<0.001; cardiac: 0.60, P=0.003) and less likely to have appropriate DR screening in place (renal: OR=0.49, P<0.001; cardiac: OR=0.61, P=0.004) when compared to those attending the family medicine clinic. Subjects attending the renal clinic were more likely to have DR (OR=3.85, P<0.001) and STDR (OR=6.14, P<0.001) than those attending the family medicine clinic.
4. Subjects who attended a GOPC for diabetes care as well as a specialist clinic were more likely to have been offered DR screening (OR=2.05, P=0.001) and have appropriate DR screening in place (OR=2.09, P<0.001) than those who do not attend a GOPC. However, access to a GOPC was not significantly associated with the presence of DR and STDR.

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Introduction

Diabetic retinopathy (DR) is a complication of diabetes mellitus (DM); screening for DR is one of the most cost-effective health procedures available.[1-3] The Hospital Authority of Hong Kong have set up screening services within General Outpatient Clinics (GOPCs), at which people with DM are screened at least once every 6 months to 2 years depending on individual risk factors.[4,5] However, some patients who attend some specialist clinic or a private general practitioner for diabetes care may not be screened. These people probably have risk factors (such as longer duration of diabetes, high blood pressure, and high cholesterol levels) of avoidable blindness.

In a previous pilot study at Queen Mary Hospital, among 3276 patients screened for DR, 17% were identified to have sight-threatening diabetic retinopathy (STDR) at screening and required specialist confirmation and about 4% had maculopathy (unpublished results). These patients were from a variety of other specialist clinics. We did not know how many of them had been screened and how many were under ophthalmologist care. In the present study, we aimed to (1) identify the prevalence of DR in a representative sample of attenders at specialist clinics in a general hospital, (2) collect data on previous and current screening and/or care for DR, usual source of care for DM, and other factors that could disrupt the continuity of complication monitoring, and (3) identify the characteristics of those who went through the net of complication screening so as to improve service provision.

Methods

Patients with DM who had an appointment in any cardiac, renal, diabetic, or family medicine specialist clinic in the United Christian Hospital in the subsequent 9 months were identified. They were contacted by telephone to obtain consent to participate, complete a structured telephone interview, and be invited for DR screening by an optometrist using a non-mydriatic retinal camera. Based on the UK National Screening Programme for Diabetic Retinopathy grading scheme, DR grading was classified as no retinopathy, background retinopathy, pre-proliferative retinopathy, proliferative retinopathy, maculopathy, or photocoagulation. STDR was defined as pre-proliferative retinopathy to photocoagulation. For those who had been screened but did not take up DR screening, their DR status was extracted from their medical records. Univariate and multivariate logistic regression models were used to investigate whether system factors (ie, specialist clinic attendance and access to a GOPC for

diabetes care) were associated with (1) being offered DR screening, (2) having appropriate DR screening in place (defined as screening attended within the last 2 years and offered by a public GOPC or ophthalmologist, an optometrist (public or private), a diabetic clinic (public or private), or a public family medicine specialist clinic, (3) presence of any DR, and (4) presence of STDR.

Results

A total of 2136 patients were contacted. Of 1761 patients eligible, 1313 (74.6%) agreed to participate, of whom 411 attended screening. Of the remaining 902 subjects who did not attend screening, 778 had their DR records extracted for analysis. Of 1313 patients, 1051 (80.1%) reported that they had been offered DR screening before, most commonly by the hospital diabetic clinic (41.0%, n=431), followed by the GOPC (13.7%, n=144), the hospital ophthalmology department (8.4%, n=88), and the hospital family medicine clinic (8.4%, n=88). Among 262 patients who reported never having been offered DR screening, only 44 (16.8%) knew where they could have it done. Of 1313 patients, only 738 (56.2%) had appropriate DR screening in place. Of 1189 DR results available (411 attended screening and 778 had medical records extracted), 17 were ungradable and 1172 were gradable. Of the latter, the overall unweighted prevalence of DR and STDR was 48.6% (n=570) and 16.3% (n=191), respectively, compared with 41.8% (95% CI=37.5%-46.1%) and 10.4% (95% CI=8.1%-12.7%) after weighting by the number of patients with appointments in the clinic in the same period.

Compared with those attending the family medicine clinic, those attending the renal clinic (odds ratio [OR]=0.48, P<0.001) and cardiac clinic (OR=0.60, P=0.003) were less likely to be offered DR screening and have appropriate DR screening in place (OR=0.49, P<0.001 and OR=0.61, P=0.004, respectively) [Table]. Compared with those attending the family medicine clinic, those attending the renal clinic were more likely to have DR (OR=3.85, P<0.001) and STDR (OR=6.14, P<0.001) [Table]. Those attending the GOPC for diabetes care and the specialist clinic were more likely to have been offered DR screening (OR=2.05, P=0.001) and have appropriate DR screening in place (OR=2.09, P<0.001) than those who did not attend a GOPC (Table). However, access to GOPC was not associated with presence of DR and STDR (Table).

Discussion

Most participants who claimed never to have been offered screening did not know where to access DR screening and only half of them had appropriate screening being in place. There is room for improvement to ensure those with diabetes can access regular screening for DR with a maximum interval of 2 years, based on retinal photographs. Specialist awareness of the importance of referring those with diabetes to DR screening should be heightened, especially for those at high risk of DR and STDR. Our findings on prevalence of DR at specialist clinics are similar to those reported in a study of 164 755 primary care patients after excluding ungradable results, in which 41.3% (95% CI=41.1%-41.5%) and 10.4% (95% CI=10.2%-10.5%) were found to have DR and STDR, respectively.[4]

There were limitations to this study. A large number of patients refused our screening and claimed that they had already been screened. We extracted their DR results from medical records. They had not been randomly selected for screening and may represent a biased sample. Patients with DR results extracted from medical records had longer duration of diabetes (12.4 vs 10.1 months, P<0.001) and higher haemoglobin A1c value (7.5% vs 7.2%, P=0.005) than those attending our screening. They also had a higher rate of DR and STDR; they were selected for screening by doctors probably because of higher risk. Excluding them might have resulted in a lower risk sample at screening. We therefore combined the two groups for analysis. Whether patients have ever been offered DR screening or appropriate DR screening in place was based on self-reported data collected retrospectively and may subject to recall bias. We tried to reduce this bias by confirming the information with a series questions on specifications (who offered screening, the name of place, the date of screening, and whether screened with a camera). We followed up the DR status in STDR cases detected by our screening, but we did not have follow-up results of STDR cases detected by other programmes. This may have resulted in overreporting.

Conclusion

Both system factors of specialist clinic attendance and access to a GOPC for diabetes care affected access to DR screening. Those attending specialist clinics (rather than family medicine clinic in the hospital) and those not attending a GOPC with DR screening settings may have been missed to be screened for DR. These system factors should be emphasised to improve the preventive care for those at high risk of avoidable vision loss, especially for those attending renal and cardiac clinics.

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TABLE. Multivariate analyses of factors associated with screening being offered, appropriate screening in place, diabetic retinopathy, and sight-threatening diabetic retinopathy

Variable	Screening being offered (n=1311)		Appropriate screening in place (n=1311)		Diabetic retinopathy (n=1165)		Sight-threatening diabetic retinopathy (n=1166)	
	Odds ratio (95% confidence interval)	P value	Odds ratio (95% confidence interval)	P value	Odds ratio (95% confidence interval)	P value	Odds ratio (95% confidence interval)	P value
Age, y	0.98 (0.96-0.99)	<0.001	0.97 (0.96-0.99)	<0.001	0.98 (0.97-1)	0.023	0.95 (0.93-0.97)	<0.001
Sex								
Female	1.00		1.00		1.00		1.00	
Male	1.03 (0.75-1.42)	0.847	1.01 (0.73-1.38)	0.959	2.59 (1.82-3.7)	<0.001	1.89 (1.15-3.1)	0.012
Marital status								
Never married	1.00		1.00		1.00		1.00	
Married	1.30 (0.83-2.04)	0.249	1.32 (0.85-2.07)	0.219	0.99 (0.62-1.6)	0.982	0.75 (0.41-1.37)	0.35
Divorced/separated/ widowed	1.38 (0.82-2.33)	0.227	1.39 (0.83-2.35)	0.213	1.38 (0.79-2.44)	0.259	1.08 (0.52-2.25)	0.84
Education level								
No schooling/pre-primary	1.00		1.00		1.00		-	
Primary	1.12 (0.73-1.73)	0.596	1.16 (0.76-1.78)	0.496	0.73 (0.45-1.19)	0.203	-	-
Secondary lower (Forms 1-5)	0.98 (0.61-1.57)	0.93	1.04 (0.65-1.67)	0.859	0.76 (0.45-1.29)	0.31	-	-
Form 6 and above	1.75 (0.96-3.19)	0.066	1.85 (1.02-3.34)	0.043	0.41 (0.22-0.8)	0.008	-	-
Monthly family income								
<$9999	1.00		1.00		1.00		1.00	
$10000-19999	0.95 (0.64-1.42)	0.816	0.95 (0.64-1.41)	0.8	1.16 (0.75-1.8)	0.497	1.13 (0.64-1.99)	0.665
$20000-29999	1.06 (0.67-1.67)	0.816	1.06 (0.67-1.67)	0.808	0.69 (0.42-1.12)	0.135	0.91 (0.47-1.76)	0.779
$30000-39999	1.36 (0.74-2.49)	0.322	1.35 (0.73-2.47)	0.337	1.67 (0.92-3.05)	0.094	1.50 (0.69-3.26)	0.301
≥$40000	0.65 (0.38-1.1)	0.107	0.64 (0.38-1.1)	0.106	0.81 (0.46-1.43)	0.47	0.60 (0.26-1.39)	0.237
Refuse to answer/don't know	0.96 (0.69-1.33)	0.804	0.95 (0.69-1.32)	0.779	1.11 (0.77-1.59)	0.581	0.80 (0.47-1.35)	0.408
Receiving Comprehensive Social Security Assistance								
No	1.00		1.00		1.00		-	
Yes	0.79 (0.55-1.14)	0.205	0.77 (0.54-1.1)	0.155	1.72 (1.14-2.57)	0.009	-	-
Currently access to general outpatient clinic								
No	1.00		1.00		1.00		1.00	
Yes	2.05 (1.36-3.1)	0.001	2.09 (1.38-3.15)	<0.001	0.97 (0.63-1.52)	0.909	0.57 (0.24-1.36)	0.208
Attended specialist clinic								
Family medicine clinic	1.00		1.00		1.00		1.00	
Cardiac clinic	0.60 (0.43-0.84)	0.003	0.61 (0.44-0.85)	0.004	1.26 (0.87-1.81)	0.225	0.93 (0.46-1.88)	0.839
Diabetic clinic	1.47 (0.98-2.21)	0.06	1.50 (1-2.24)	0.05	1.20 (0.79-1.83)	0.394	1.56 (0.81-3.02)	0.186
Renal clinic	0.48 (0.34-0.67)	<0.001	0.49 (0.35-0.69)	<0.001	3.85 (2.61-5.69)	<0.001	6.14 (3.46-10.89)	<0.001
Know diabetes could affect blindness (diabetic retinopathy)								
No	1.00		1.00		-		-	
Yes	1.39 (0.68-2.82)	0.362	0.73 (0.54-1)	0.05	-	-	-	-
Don't know	0.93 (0.43-1.99)	0.853	0.69 (0.51-0.93)	0.015	-	-	-	-
Think early diabetic retinopathy symptomatic								
No	1.00		-		-		1.00	
Yes	0.72 (0.53-0.99)	0.04	-	-	-	-	0.79 (0.51-1.21)	0.28
Don't know	0.71 (0.52-0.98)	0.034	-	-	-	-	0.60 (0.36-0.98)	0.04

TABLE. (cont'd)

Variable	Screening being offered (n=1311)		Appropriate screening in place (n=1311)		Diabetic retinopathy (n=1165)		Sight-threatening diabetic retinopathy (n=1166)	
	Odds ratio (95% confidence interval)	P value	Odds ratio (95% confidence interval)	P value	Odds ratio (95% confidence interval)	P value	Odds ratio (95% confidence interval)	P value
Aware that there is treatment for diabetic retinopathy								
No	1.00		-		1.00		1.00	
Yes	0.91 (0.71-1.18)	0.49	-	-	1.54 (1.18-2.01)	0.002	3.25 (2.18-4.84)	<0.001
Smoking status								
Non-smoker	1.00		1.00		1.00		1.00	
Ex-smoker	1.21 (0.86-1.7)	0.281	1.20 (0.86-1.69)	0.284	0.89 (0.61-1.29)	0.532	1.18 (0.7-1.99)	0.534
Current smoker	0.96 (0.62-1.48)	0.845	0.96 (0.62-1.49)	0.865	0.77 (0.48-1.24)	0.282	0.49 (0.24-1.03)	0.061
Alcohol intake								
Never	1.00		1.00		1.00		1.00	
Ex-drinker	0.96 (0.65-1.41)	0.832	0.97 (0.66-1.42)	0.887	1.07 (0.7-1.64)	0.747	1.39 (0.79-2.42)	0.251
Drink less than once a month (eg special occasions)	1.12 (0.76-1.65)	0.555	1.12 (0.76-1.65)	0.557	0.99 (0.65-1.49)	0.944	0.63 (0.33-1.19)	0.154
Current drinker	1.78 (1.05-3.05)	0.034	1.76 (1.03-2.99)	0.038	0.80 (0.46-1.38)	0.415	0.43 (0.17-1.06)	0.068
Duration of diabetes, y	1.04 (1.02-1.05)	<0.001	1.04 (1.02-1.05)	<0.001	1.06 (1.04-1.08)	<0.001	1.06 (1.04-1.09)	<0.001
Type of diabetes								
Type 1	1.00		1.00		1.00		1.00	
Type 2	0.47 (0.19-1.11)	0.084	0.47 (0.2-1.12)	0.089	2.28 (1.18-4.37)	0.014	14.25 (3.93-51.66)	<0.001
Others	0.89 (0.12-6.34)	0.908	0.84 (0.12-6.08)	0.864				
Haemoglobin A1c, %	1.07 (0.98-1.17)	0.113	1.07 (0.98-1.17)	0.12	1.18 (1.07-1.29)	0.001	1.07 (0.95-1.2)	0.293
Systolic blood pressure, mm Hg	1.00 (1-1.01)	0.371	1.00 (1-1.01)	0.362	1.01 (1-1.02)	0.004	1.03 (1.02-1.04)	<0.001
Diastolic blood pressure, mm Hg	0.99 (0.97-1)	0.038	0.99 (0.97-1)	0.044	0.98 (0.96-0.99)	0.003	0.96 (0.94-0.98)	0.001
Self-perceived health								
Excellent	-		-		1.00		-	
Good	-	-	-	-	1.54 (0.52-4.53)	0.436	-	-
Average	-	-	-	-	1.75 (0.62-4.95)	0.295	-	-
Fair	-	-	-	-	2.38 (0.82-6.86)	0.109	-	-
Poor	-	-	-	-	1.84 (0.6-5.64)	0.288	-	-

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