Editorial

Missed Appointments at a Diabetes Centre: Not a Small Problem

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Fundamental to optimal diabetes management is good patient self-care and regular follow-up with health professionals. Missed appointment may disrupt the continuity of diabetes care, thereby interfering with regular preventive screening and timely intervention.[1] It may also affect care for other patients due to interference with scheduling, poor use of resources and negative impact on doctor-patient relationship.[2]

The prevalence of missed appointment at diabetes clinics varied considerably. For example, it was reported in a review by Griffin SJ that the prevalence of non-attendance for at least a year from diabetes clinic in the United Kingdom was 4% to 8%.[2] A study by Karter AJ et al[1] showed that 64% of diabetic patients missed 1 or more appointments based on data from the Kaiser Permanente Diabetes Registry, whereas another study by Nuti LA et al[3] reported that 16.2% of diabetic patients missed their last scheduled appointment in a medical centre. The differences could be attributed to variations in settings and lack of common measures of missed appointment.

Studies have revealed a multitude of factors associated with missed appointments including age,[1,4] shorter duration of diabetes,[4] days from scheduling to appointment,[5,6] days of week and time of appointment.[5] However, information on missed appointments in patients with diabetes in Singapore remains limited. Hence, we assessed the magnitude and risk factors of missed appointments in the Diabetes Centre in our hospital, a dedicated one-stop multidisciplinary centre to provide more holistic care and where a short message service (SMS) appointment reminder system has been in place since inception. The findings will enable us to account for these factors when scheduling appointments and apply appropriate strategies to encourage attendance.

We conducted a retrospective cohort study of patients who first attended doctor's appointment at Diabetes Centre between 1 June 2010 and 31 May 2012. Their attendance for appointments was tracked till 31 December 2013. Missed appointments comprised scheduled appointments which were not attended nor cancelled. Data on patient and appointment characteristics were extracted or derived from the hospital administrative database. We analysed the data in 2 ways – 1) patients who missed most recent appointment as the primary analysis, using a study by Lee VJ et al[6] as reference, and 2) patients who missed >30% of scheduled appointments as a secondary analysis, using a study by Karter AJ et al[1] as reference.

In our study, there were altogether 13,244 appointments scheduled for 1645 patients at Diabetes Centre. Failed appointments accounted for 13.8% of these appointments. Of the 1645 patients, 53.7% missed one or more appointments. Of note, 229 patients (13.9% of the study population) who missed more than 2 appointments accounted for 53.5% of the missed appointments. After excluding 2 patients who died and 33 patients whose missed appointment occurred during hospitalisation, a total of 1610 patients were included in the analysis for most recent missed appointments. Of these, 25.5% had failed most recent appointment.

Our results showed that patients who missed most recent appointment tended to be younger, males, from Malay, Indian and Other ethnic groups and have fewer annual scheduled appointments. They were also more likely to have intrahospital referral, >20% of previous missed appointments, hospitalisation between previous and most recent appointments and repeated last scheduled appointment, with intervals 31 to 60 days and 61 to 90 days from previous appointment, and appointment during January-July (P <0.05 for all) (Table 1). In the multivariable model adjusted for age and gender, >20% of previously missed appointments, Malay, Indian and Other ethnic groups, appointment in January to September, intervals of 31 to 60 days and 61 to 90 days between previous and current scheduled appointments, age ≤40 years, and fewer annual scheduled appointments were significantly associated with missing most recent appointment (Table 2). The area under receiver operating characteristic (ROC) curve of the final model was 0.748 (95% CI, 0.720 to 0.776).

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Table 1. Characteristics of Patients by Missing Most Recent Appointment and Rate of Missed Appointments

Characteristic	All Patients (n = 1610)	Missed Most Recent Appointment			Rate of Missed Appointments		
		No (n = 1200)	Yes (n = 410)	P Value	0% to 30% Missed Appointment Rate (n = 1246)	>30% Missed Appointment Rate (n = 364)	P Value
Age (years)	56.0 ± 14.4	56.7 ± 14.0	53.7 ± 15.3	0.002	56.9 ± 14.0	52.7 ± 15.1	<0.001
Age group				<0.001			<0.001
≤30 years	92 (5.7)	50 (4.2)	42 (10.2)		57 (4.6)	35 (9.6)	
31 – 40 years	162 (10.1)	116 (9.7)	46 (11.2)		113 (9.1)	49 (13.5)	
41 – 50 years	275 (17.1)	207 (17.3)	68 (16.6)		207 (16.6)	68 (18.7)	
51 – 60 years	440 (27.3)	327 (27.3)	113 (27.6)		344 (27.6)	96 (26.4)	
61 – 70 years	379 (23.5)	301 (25.1)	78 (19.0)		312 (25.0)	67 (18.4)	
>70 years	262 (16.3)	199 (16.6)	63 (15.4)		213 (17.1)	49 (13.5)	
Gender				0.007			0.013
Female	787 (48.9)	610 (50.8)	177 (43.2)		630 (50.6)	157 (43.1)	
Male	823 (51.1)	590 (49.2)	233 (56.8)		616 (49.4)	207 (56.9)	
Ethnic group				<0.001			<0.001
Chinese	969 (60.2)	763 (63.6)	206 (50.2)		793 (63.6)	176 (48.4)	
Malay	222 (13.8)	153 (12.8)	69 (16.8)		158 (12.7)	64 (17.6)	
Indian	316 (19.6)	214 (17.8)	102 (24.9)		222 (17.8)	94 (25.8)	
Others	103 (6.4)	70 (5.8)	33 (8.1)		73 (5.9)	30 (8.2)	
Consultation type				0.118			0.063
Private	330 (20.5)	257 (21.4)	73 (17.8)		268 (21.5)	62 (17.0)	
Subsidised	1280 (79.5)	943 (78.6)	337 (82.2)		978 (78.5)	302 (83.0)	
First appointment				<0.001			
Yes	172 (10.7)	151 (12.6)	21 (5.1)				
No	1438 (89.3)	1049 (87.4)	389 (94.9)				
Referral source				<0.001			0.002
Polyclinic	370 (23.0)	276 (23.0)	94 (22.9)		293 (23.5)	77 (21.2)	
General practitioner	55 (3.4)	45 (3.8)	10 (2.4)		49 (3.9)	6 (1.7)	
Self	136 (8.5)	112 (9.3)	24 (5.9)		110 (8.8)	26 (7.1)	
Intrahospital	789 (49.0)	562 (46.8)	227 (55.4)		583 (46.8)	206 (56.6)	
Public institutions	196 (12.2)	165 (13.8)	31 (7.6)		166 (13.3)	30 (8.2)	
Others	64 (4.0)	40 (3.3)	24 (5.9)		45 (3.6)	19 (5.2)	
Month of the year				<0.001			
January	63 (3.9)	37 (3.1)	26 (6.3)				
February	66 (4.1)	39 (3.3)	27 (6.6)				
March	58 (3.6)	36 (3.0)	22 (5.4)				
April	90 (5.6)	52 (4.3)	38 (9.3)				
May	80 (5.0)	53 (4.4)	27 (6.6)				
June	92 (5.7)	54 (4.5)	38 (9.3)				
July	96 (6.0)	69 (5.8)	27 (6.6)				
August	119 (7.4)	89 (7.4)	30 (7.3)				
September	158 (9.8)	120 (10.0)	38 (9.3)				
October	253 (15.7)	210 (17.5)	43 (10.5)				
November	255 (15.8)	211 (17.6)	44 (10.7)				
December	280 (17.4)	230 (19.2)	50 (12.2)				

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Characteristic	All Patients (n = 1610)	Missed Most Recent Appointment			Rate of Missed Appointments		
		No (n = 1200)	Yes (n = 410)	P Value	0% to 30% Missed Appointment Rate (n = 1246)	>30% Missed Appointment Rate (n = 364)	P Value
Day of the week scheduled				0.629			
Monday	356 (22.1)	267 (22.3)	89 (21.8)				
Tuesday	267 (16.6)	206 (17.2)	61 (14.9)				
Wednesday	322 (20.0)	244 (20.4)	78 (19.1)				
Thursday	436 (27.1)	319 (26.6)	117 (28.6)				
Friday	227 (14.1)	163 (13.6)	64 (15.7)				
Time of scheduled appointment (hours)				0.240			
0700 – 0900	473 (29.4)	365 (30.4)	108 (26.3)				
1000 – 1200	645 (40.1)	469 (39.1)	176 (42.9)				
1300 – 1400	275 (17.1)	199 (16.6)	76 (18.5)				
1500 – 1700	217 (13.5)	167 (13.9)	50 (12.2)				
Days from previous appointment date to current appointment date (days)	97.0 (67.0 – 119.0)	98.0 (70.0 – 119.0)	91.0 (63.0 – 126.0)	0.254			
Days from previous appointment date to current appointment date (days)				0.003			
Up to 30 days	140 (9.5)	105 (9.8)	35 (8.6)				
31 to 60 days	170 (11.5)	109 (10.1)	61 (15.1)				
61 – 90 days	335 (22.6)	229 (21.3)	106 (26.2)				
More than 90 days	836 (56.5)	633 (58.8)	203 (50.1)				
Annual number of scheduled appointments	3.0 (2.0 – 3.8)	3.0 (2.0 – 3.8)	2.5 (2.0 – 3.3)	<0.001	3.0 (2.0 – 4.0)	2.3 (2.0 – 3.0)	<0.001
Percentage of previous missed appointments				<0.001			
Up to 20%	1159 (78.3)	890 (82.7)	269 (66.4)				
21% to 40%	198 (13.4)	128 (11.9)	70 (17.3)				
41% to 60%	99 (6.7)	47 (4.4)	52 (12.8)				
More than 60%	25 (1.7)	11 (1.0)	14 (3.5)				
Hospitalisation between previous appointment date and recent appointment visit date				0.012			
No	1429 (88.8)	1079 (89.9)	350 (85.4)				
Yes	181 (11.2)	121 (10.1)	60 (14.6)				

Table 2. Factors Associated with Most Recent Missed Appointment and Rate of Missed Appointment in Multivariable Logistic Regression Models

Characteristics	Odds Ratio (95% CI) P Value	
	Most Recent Missed Appointment*	More than 30% Missed Appointment Rate†
Age group		
Up to 40 years	1.59 (1.08 – 2.32) 0.018	2.40 (1.67 – 3.43) <0.001
41 to 60 years	1.00 (0.76 – 1.33) 0.982	1.32 (1.00 – 1.75) 0.049
More than 60 years	1.00	1.00
Gender		
Female	1.00	1.00
Male	1.14 (0.88 – 1.47) 0.332	1.25 (0.97 – 1.61) 0.079
Ethnic group		
Chinese	1.00	1.00
Malay	1.47 (1.02 – 2.13) 0.039	1.80 (1.27 – 2.55) 0.001
Indian	1.94 (1.41 – 2.67) <0.001	2.23 (1.64 – 3.03) <0.001
Other	2.43 (1.47 – 4.03) 0.001	2.09 (1.30 – 3.38) 0.003
Consultation type		
Private	1.00	1.00
Subsidised	0.95 (0.61 – 1.49) 0.827	1.40 (0.89 – 2.19) 0.148
First appointment		
Yes	1.00	
No	1.23 (0.59 – 2.53) 0.582	
Referral source		
Polyclinic	1.00	1.00
General practitioner	0.64 (0.26 – 1.58) 0.334	0.52 (0.19 – 1.42) 0.201
Self	0.64 (0.32 – 1.31) 0.223	1.09 (0.56 – 2.13) 0.805
Intrahospital	1.16 (0.85 – 1.60) 0.352	1.43 (1.05 – 1.96) 0.024
Public institutions	0.57 (0.35 – 0.93) 0.023	0.75 (0.47 – 1.22) 0.250
Others	1.29 (0.66 – 2.52) 0.451	0.93 (0.49 – 1.78) 0.835
Month of the year		
January – March	2.92 (1.88 – 4.53) <0.001	
April – June	2.59 (1.79 – 3.75) <0.001	
July – September	1.46 (1.05 – 2.03) 0.026	
October – December	1.00	
Days from previous appointment date to current appointment date (days)		
Up to 30 days	1.00	
31 to 60 days	2.19 (1.26 – 3.81) 0.005	
61 – 90 days	1.83 (1.11 – 3.02) 0.017	
More than 90 days	1.25 (0.78 – 1.99) 0.359	
Annual number of scheduled appoinments	0.72 (0.63 – 0.83) <0.001	0.73 (0.66 – 0.81) <0.001
Percentage of previous missed appointments		
Up to 20%	1.00	
21% to 40%	2.02 (1.41 – 2.90) <0.001	
41% to 60%	3.34 (2.08 – 5.38) <0.001	
More than 60%	3.81 (1.49 – 9.75) 0.005	
Hospitalisation between previous appointment date and recent appointment visit date		
No	1.00	
Yes	1.05 (0.71 – 1.55) 0.813	

*The multivariable model includes age, gender, ethnic group, consultation type, first appointment, referral source, month of the year, days from previous appointment date to current appointment date, annual number of scheduled appointments, percentage of previous missed appointments and hospitalisation between previous appointment date and recent appointment visit date.
†The multivariable model includes age, gender, ethnic group, consultation type, referral source and annual number of scheduled appointments.

The distribution of 1610 patients by missed appointments rate was as follows: 0% missed appointments, 46.8%; 1% to 30% missed appointments, 30.6%; >30% missed appointments, 22.6%. Patients who missed >30% appointments tended to be younger, males and from Malay, Indian and Other ethnic groups, had higher proportion of being referred from intrahospital source and fewer scheduled appointments annually than those with 0% to 30% of missed appointments (P <0.05 for all) (Table 1). In the multivariable model adjusted for age and gender (Table 2), Malay, Indian and Other ethnic group, younger age groups of up to 60 years, intrahospital referral and fewer appointments scheduled annually were significantly associated with >30% of missed appointments.

In our study, about 54% of patients missed one or more appointments and one-quarter missed most recent appointment. Only 14% of patients missed more than 2 appointments but accounted for about half of missed appointments. Similarly, an earlier study showed that a small group of patients failed 2 or more appointments but accounted for 59% of failed appointments at a Community Health Centre.[7] Furthermore, our results demonstrated that percentage of previous missed appointments is a strong risk factor of missing most recent appointment. Intensive measures can be taken to target patients with history of frequent defaults in order to reduce missed appointments substantially.

Similar to earlier research,[6] Malay, Indian and Other ethnic groups had higher odds of missing most recent appointment and frequent default in our study. The younger age group was more likely to miss most recent appointment or have poor appointment keeping behaviour than the older age groups in our study, in line with earlier studies.[3,4,6] The younger patients could have missed appointments due to commitments such as child care and employment. Secondly, they may tend to default when their condition improved.[8] Further research is needed to understand health-seeking behaviours and attitudes of patients by ethnic groups and age.

Longer interval between previous and current appointments increased the likelihood of missing most recent appointment. Forgetting appointment was cited as one of the top reasons for missing appointment.[9]

Fewer annual scheduled appointments was associated with missing most recent appointment and frequent default in our study. Patients who frequently defaulted appointment were more likely to make appointments and perceived less need to attend appointment when they felt better.[10]

To our knowledge, this is the first published study on missed appointments among patients attending a diabetes centre in Singapore. Our study reinforces earlier findings on the factors for missed appointment. Furthermore, the high area under the ROC curve for final model affirms the value of utilising routine hospital administrative data that is readily available without additional cost.

There are limitations in our study. Causality cannot be established in the retrospective observational design of our study. Secondly, our results cannot be extrapolated to the general population with diabetes or other clinical settings. As the administrative database is not designed for this study, we could not capture potential socioeconomic and clinical factors that may impact upon attendance.

In conclusion, a small group of patients contributed to a large proportion of missed appointments. Our study has shed light on the profile of patients at risk for frequent default. Using routine administrative database, we uncovered potential modifiable factors amenable to interventions.

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