

# Appropriateness of Referrals for Specialist Diabetes Care



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## Introduction

Tertiary diabetes care services are a scarce resource which should be conserved for the most appropriate patients. Total of 52 endocrinologists provide specialist diabetes care in both private (16) and public sectors (36) in Singapore.<sup>1</sup> The 'appropriateness' of referral is a complicated parameter to measure.<sup>2</sup> We sought to determine the appropriateness of referrals of diabetes patients to a specialist diabetes centre and explore the factors associated with inappropriate referrals.

## Methods

- Retrospective review of 350 outpatient clinical records and referral letters of all newly referred diabetes patients between 01 June 07 and 31 August 07 in a tertiary hospital's diabetes centre.
- Review by a trained physician reviewer who was not involved in the care of these patients.
- Two sets of criteria for assessment of 'appropriateness' of referrals were used. The first set of criteria for referral was defined by an expert panel of endocrinologist, while the other was taken from continuing care of guidelines outlined by Ministry of Health, Singapore (Table 1).
- The referral criteria includes both clinical and laboratory parameters in defining 'appropriateness'.
- The criteria were met if any one of seven conditions in both criteria was satisfied.

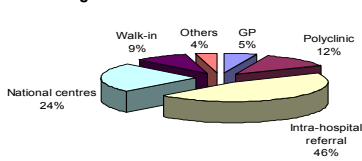
**Table 1. Referral Criteria for appropriate referrals from Primary to Specialist care for patients with diabetes mellitus**

Expert panel criteria	MOH criteria
Adolescents with diabetes mellitus (age ≥16)	Children and adolescents with diabetes
Adult with type 1 diabetes mellitus	Adult with type 1 diabetes mellitus
Pregnant diabetics or diabetic women planning pregnancy	Pregnant diabetics or diabetic women planning pregnancy
History of acute complications such as hypoglycaemia, diabetic ketoacidosis (DKA), hyperosmolar hyperglycaemic non-ketotic syndrome (HHNK)	Individual with or at risk for recurrent severe hypoglycaemia, DKA or HHNK regardless of HbA <sub>1c</sub> level
HbA <sub>1c</sub> >8%	Patients who fail to reach individualized targets set for blood glucose, blood pressure and/or lipid
LDL>2.6, HDL<1, TG>2.3	Patients with co-morbid medical conditions requiring active management
Type 2 diabetics requiring insulin for active management	Micro and macro-vascular Diabetic complications

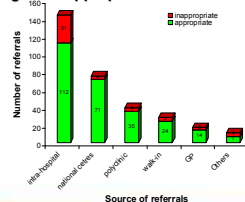
## Results

A total of 350 new diabetes referrals were initially retrieved from the database between June and August 2007. We excluded 37 cases because 24 cases were not for diabetes care and 13 medical case records were not available at the time of data collection. We analysed 313 patients' medical records and referral letters. The mean age of patients was 58 years, 171 (55%) were male. The demographic characteristics of study cohort were broadly representative of all the patients seen in the Diabetes Centre in 2007 (Table 2). Of the 313 new referrals, 84% met the criteria for appropriate referral developed by an expert panel of endocrinologists, while 85.7% met the Ministry of Health criteria. The majority of referral sources was intra-hospital referral (46%) followed by specialist national centres (24%), with polyclinics referring 12% (Figure 1 and 2). Patients referred from intra-hospital departments were less likely to meet both criteria for appropriate referral than other sources (inappropriate referrals 62% vs. 48% p = 0.02).

**Figure 1. Sources of Diabetes Referral**



**Figure 2. Appropriateness of referrals**



The mean HbA<sub>1c</sub> measure was 8.4% (±2.1) and the mean LDL (Low-density lipoprotein) cholesterol was 3.1mmol/l (±1.1) at the time of referral. Table 3 shows clinical and biochemical characteristics of new referrals patients.

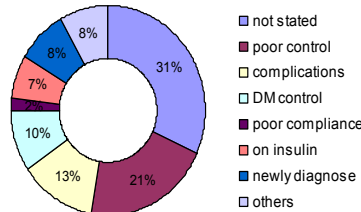
**Table 2. Demographic profiles of study cohort and Diabetes Centre patients in 2007**

Variables	Study Cohort (N = 313)	Diabetes Centre patients 2007 (N=5953)
Age (yr) – Mean (SD)	58.2 ± 12.9	58 ± 14
Male sex – no (%)	171 (55%)	(50%)
Race – no (%)		
Chinese	201 (64%)	(65%)
Malay	25 (8%)	(12%)
Indian	61 (20%)	(17%)
Others	26 (8%)	(6%)
Payer Classes– no (%)		
Subsidized	208 (67%)	(73%)
Private	80 (26%)	(24%)
Non-resident	25 (8%)	(3%)
Civil Service Card Status – no (%)		
YES	35 (11%)	(13%)
NO	278 (89%)	(87%)

**Table 3. Descriptive characteristic of Clinical and biochemical parameters**

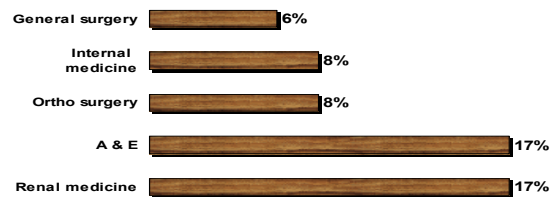
Variables	Value	N
BMI (Kg/m <sup>2</sup> ) – mean±SD	25.8 ± 5.14	255
Blood Pressure (mmHg) - mean±SD		292
Systolic	137.1 ± 22.1	
Diastolic	76.4 ± 11.8	
Duration of diabetes (yr) – mean±SD	9.8 ± 8.5	265
Type of diabetes – no (%)		301
Type 1	6 (2.0)	
Type 2	289 (96.0)	
GDM	3 (1.0)	
Other	3 (1.0)	
Modality of diabetes control– no (%)		313
Diet only	13 (4.1)	
OHGA	203 (64.9)	
Insulin	42 (13.4)	
OHGA +Insulin	55 (17.6)	
HbA <sub>1c</sub> (%) – Mean ± SD	8.4 ± 2.1	305
≤ 7% no (%)	82 (26.9)	
7.01 – 8% no (%)	85 (27.9)	
8.01 – 9% no (%)	45 (14.8)	
>9%	93 (30.5)	
Total Cholesterol (TC) Mean ± SD (mmol/l)	5.0 ± 1.1	66
High-density lipoprotein (HDL) Mean ± SD (mmol/l)	1.2 ± 0.3	102
Triglyceride (TG) Mean ± SD (mmol/l)	2.0 ± 1.8	74
Low-density lipoprotein (LDL) Mean ± SD (mmol/l)	3.1 ± 1.1	97
≤ 2.6 no (%)	39 (40.2)	
2.601 – 3.4 no (%)	24 (24.7)	
>3.4 no (%)	34 (35.1)	
TC/HDL Mean ± SD	4.6 ± 1.8	49
Creatinine ( μmol/l) Mean ± SD	121.7 ± 80.1	121

**Figure 3. Reasons for diabetes referrals**



The common reasons stated in referral letters were 'poor glycaemic control' (21%) and 'diabetes with complications' (13%). However, most of them did not state reasons for referrals (Fig. 3).

**Figure 4. Top 5 intra-hospital departments of diabetes referrals**



Leading intra-hospital referral sources were emergency and renal departments (17% each of intra-hospital referrals) (Fig. 4).

## Conclusion

Fourteen to sixteen percent of referrals for specialist diabetes care were inappropriate based on the set criteria. Inappropriate referrals were more likely to be internally generated from other hospital departments.

## References

- Singapore Medical Council Annual Report 2006. <https://www.smc.gov.sg/html/MunGoBiobs/714/531/SMC%20Annual%20Report%202006.pdf>
- Pheleps CE. The methodologic foundations of studies of the appropriateness of medical care. N Engl J Med 1993; 329: 1241-5.