

Survey on knowledge and attitudes regarding diabetic inpatient management by medical and nursing staff at Kalafong Hospital



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Objective. The objective of this study was to evaluate perceptions regarding current practices in the care of diabetic inpatients as well as the knowledge and attitudes of nursing and medical caregivers at a large secondary hospital.

Design and methods. Doctors and nurses taking care of diabetic inpatients were surveyed to assess their knowledge of diabetes inpatient management and their attitudes towards diabetic patients. The survey made use of the diabetes knowledge questionnaire (O'Brien) and the DAS3 scale.

Results. The survey group comprised 115 health care providers, of whom 54 were doctors and 61 were nurses. The response rate was 82%. The doctors achieved a mean score of 68.3% (standard deviation (SD) 11.5%) and the nurses 53.9% (SD 16.3%) for the diabetes knowledge questionnaire. The DAS3 questionnaire indicated that 80.9% of health care personnel strongly agree that special training for managing diabetic patients is necessary, 90.5% agree or strongly agree that type 2 diabetes is a serious condition, 92.2% agree or strongly agree that tight glycaemic control is valuable, 85.2% agree or strongly agree that diabetes has a significant psychosocial impact on patients, and 88.7% agree or strongly agree that patients should have autonomy regarding their treatment.

Conclusions. Health care workers (doctors and nurses) in a large secondary hospital have average to poor knowledge about the care of diabetic inpatients. The DAS3 questionnaire, however, indicates that health care workers have a good attitude towards diabetic patients and realise that special training is necessary.

Developed and developing countries are currently encountering an upsurge in the prevalence of diabetes. The burden of this disorder seems to be disproportionately large in non-European populations, with Hispanic, Native American, Pacific and Indian Ocean island populations, and Indian and Australian Aboriginal communities heading the list.¹

The 2003 global burden of diabetes has been estimated to be 150 million people, and is expected to rise to 220 million by 2010 and to 300 million by 2025.¹ In South Africa, the prevalence of diabetes varies from 3% to 28%, depending on the population studied, the age range, and whether the population is rural or urban.²

Diabetic patients are more likely to be admitted to hospital, and diabetes is a frequent co-morbidity in hospitalised patients. Diabetes also contributes significantly to prolonged hospital stays and inpatient

mortality.^{3,4} Patients with diabetes need admission to hospital for the usual variety of reasons, which may or may not be related to diabetes.⁵ Diabetes, however, frequently complicates the condition for which they were admitted.⁶ For this reason, health care providers, irrespective of the discipline in which they work, need to have knowledge of inpatient diabetes management. Moreover, hospitalisation of diabetic patients is costly, and this cost is usually related to complications of diabetes.^{6,7}

Improving in-hospital diabetes care requires a multilevel and multidisciplinary approach, mediated by the personnel who interact with patients during hospitalisation, i.e. doctors and nurses.⁸ Most trainee physicians did not think that additional training in diabetes care was necessary; this constitutes a significant obstacle in improving diabetes care.⁹ Resident physicians, on the other hand, felt that lack of time was a greater obstacle to quality of

patient care than a lack of training.⁹ It is possible that inadequate diabetes management practices on the part of resident doctors could be the result of lack of knowledge and experience. A systematic approach to educating residents in inpatient diabetes management could improve the care of hospitalised diabetic patients.¹⁰

A number of studies assessing nurses after education programmes concluded that a discrepancy exists between the knowledge and behaviour of nurses caring for diabetic patients. It seems that nurses primarily change their clinical practice as a result of new knowledge obtained via unit-based training resources. It therefore follows that training of nurses should be done on a unit-based basis.^{11,12}

In a survey of 27 junior doctors and 143 nurses on their knowledge of management of diabetic inpatients, the average doctors' score was 48 out of 66 and that for nurses was 51 out of 66. Doctors scored better in the physiology and complications sections, and nurses fared better in the questions related to practical management of diabetes.¹³

Owing to the increasing prevalence of diabetic inpatients, a survey was conducted to assess knowledge and attitudes of doctors and nurses caring for patients with diabetes at Kalafong, a large secondary hospital.

Methods

The survey targeted the knowledge and attitudes of medical and nursing staff about service delivery to diabetic inpatients. All doctors and nursing staff caring for adult patients with diabetes were approached to take part in the survey, irrespective of the hospital unit or discipline in which they worked. Doctors were approached for participation regardless of seniority. Questionnaires as well as a covering letter explaining the importance of the study were given to all doctors attending departmental morbidity and mortality meetings, and they were requested to complete the questionnaires immediately. Questionnaires and covering letters were also distributed to all nursing units with adult diabetic patients, requesting nurses at all levels to complete the questionnaire. This was done once during the day shift and once during the night shift. All forms were completed anonymously.

The questionnaires distributed to medical staff included the DAS3 questionnaire (to assess attitude towards diabetic patients), a diabetes inpatient knowledge questionnaire, and a questionnaire to assess the perceptions of care, issues related to referral systems and the availability of diabetes educators, and current prescription habits of physicians; this included demographic data of the health care professional.

The Diabetes Knowledge Questionnaire SVO version 7/1/06 compiled by O'Brien¹³ was used, with minor adaptations for local circumstances. The questionnaire was developed and standardised for junior doctors and general nurses who take care of diabetic inpatients; it comprises 11 sections, each section containing 6 items. The sections cover the following aspects of diabetes care knowledge: physiology, blood glucose monitoring, medications, hypoglycaemia, insulin use, hyperglycaemia, complications, diet, screening/prevention, surgery and a general section. All 66 questions require a 'yes', 'no' or 'don't know' answer. The questionnaire has good internal reliability, with a Cronbach's alpha coefficient for nurses of 0.81 and for junior doctors of 0.72. The Kappa coefficient for the questionnaire was 0.689, indicating good stability over time. The questionnaire takes 15 to 20 minutes to complete. Permission to use the questionnaire was obtained from the compiler.

The DAS3 measures diabetes-related attitudes. It consists of 33 items, and assesses attitudes towards diabetes in 5 categories, namely: seriousness of diabetes type 2, the need for special training of health care workers, the value of tight glucose control, the socio-economic impact of diabetes, and the need for patient autonomy. The DAS3 scale was standardised for use by (among others) physicians and nurses.¹⁴ Permission to use this questionnaire was obtained from the Michigan Diabetes Research and Training Center.

Results

The total number of health care professionals participating was 115, of whom 54 (47%) were doctors and 61 (53%) were nurses. The overall response rate was 83%; 90% for doctors and 76% for nursing staff.

Of the 54 doctors, 36 (66%) felt that the registrar, 9 (17%) that the medical officer, 7 (13%) that the intern, and 2 (4%) that the consultant were primarily responsible for taking care of diabetic patients' blood glucose control.

Seventeen (31.5%) of the doctors felt that they frequently, 10 (18.5%) that they seldom, and 26 (48.1%) that they sometimes had problems controlling blood glucose in diabetic patients. Most doctors (31 (57%)) considered that obtaining glycaemic control in diabetic patients was difficult or problematic; the reasons were related to glycaemic control (16.7%), system and logistical issues of management (11.1%), coinciding complications (11.1%), and personal lack of knowledge and experience (7.4%).

Of all the doctors, 4 (7.4%) always, 9 (16.7%) frequently, 23 (42.6%) sometimes, 16 (30%) seldom, and 2 (3.7%) never consulted someone else about blood glucose control in their patients.

Table I. Participant information – perceptions of health care providers in caring for diabetic patients		
	Nursing staff (N=61) N (%)	Doctors (N=54) N (%)
Department	19 (31.1)	16 (29.6)
Internal medicine	11 (18)	13 (24.1)
Obstetrics and gynaecology	12 (19.7)	9 (16.7)
Orthopaedics	18 (29.1)	16 (29.6)
Surgery	1 (1.6)	
Missing/unknown		
Doctor level		15 (27.8)
Consultant		21 (38.9)
Registrar		12 (22.2)
Medical officer		6 (11.1)
Intern		
Nurse level	17 (27.9)	
Senior registered nurse	8 (13.1)	
Registered nurse	20 (32.8)	
Staff nurse	15 (24.6)	
Student nurse		
Patient load	Median: 3	Median: 3
Estimated number of patients at any moment with diabetes in hospital.	Range: 0 - 10	Range: 0 - 7

Table II. Diabetes knowledge questionnaire				
Diabetes knowledge category	Nurses' score Median (IQR)	Doctors' score Median (IQR)	All Median (IQR)	Maximum score
1. Physiology	3 (3 - 4)	5 (5 - 6)	4 (3 - 5)	6
2. Blood glucose monitoring	4 (3 - 5)	4.5 (4 - 5)	4 (4 - 5)	6
3. Diabetes medications	1 (0.5 - 2)	2 (1.5 - 4)	2 (1 - 3)	5
4. Insulin use	2 (1 - 2.5)	2 (1 - 3)	2 (1 - 3)	6
5. Hypoglycaemia	3 (2 - 4)	4 (3 - 5)	4 (3 - 4)	6
6. Hyperglycaemia	5 (3 - 5)	6 (5 - 6)	5 (4 - 6)	6
7. Diabetes complications	5 (4 - 5)	5 (4 - 5)	5 (4 - 5)	6
8. Diabetes screening and prevention	4 (3 - 5)	3 (2.75 - 4)	5 (3 - 5)	6
9. Diet in diabetes	4 (3 - 5)	3 (2.75 - 4)	4 (3 - 5)	6
10. Surgery and fasting in diabetes	4 (2 - 4)	4 (4 - 5)	4 (3 - 5)	6
11. General diabetes	2 (2 - 3)	3 (2 - 4)	2 (2 - 3)	4
Total	36 (30 - 40.5)	43 (40 - 47)	40 (34 - 44.75)	63
	Mean 33.9	Mean 43.1	Mean 38.1	
	SD 10.3	SD 7.26	SD 10.1	
	Mean % 53.9	Mean % 68.3	Mean % 60.4	
	SD 16.3	SD 11.5	SD 16.0	
				100%

IQR = interquartile range.

The reasons for admission of diabetic patients to hospital, as perceived by the doctors, were: hyperglycaemia – 24 (45%), sepsis – 23 (43%), chronic diabetes complications – 12 (23%), diabetic metabolic emergencies – 9 (17%), elective surgery – 7 (13%), trauma – 6 (11%), and other medical problems – 2 (4%). (Doctors were requested to mention the two to three most common reasons for admission of diabetic patients.)

The majority of doctors (48 (89%)) stated that patients with diabetes tended to have longer hospital stays

than non-diabetic patients. They also reported that diabetic patients were more prone to have complications while hospitalised (50 (92.6%)).

About a third of all nurses (17 (28%)) considered the management of diabetic inpatients troublesome, 40 (65%) did not, and 4 (7%) were uncertain or did not know.

Additional, more problem-based questions were put to the doctors to assess their practical knowledge of diabetes.

Table III. Ten-patient management scenario questions with true/false answers

Question	True (%)	False (%)
1. If a type 2 diabetic patient on oral therapy who is eating is admitted to hospital, the optimum treatment is to continue oral treatment with additional insulin boluses according to blood glucose values at mealtime.	*30 (55.6)	20 (37)
2. If a patient with type 2 diabetes on oral therapy is admitted and unable to eat, the most suitable treatment is an insulin sliding scale to treat hyperglycaemia.	47 (87)	*6 (11.1)
3. A type 1 diabetic patient admitted for surgery is best managed with a sliding scale, if not eating.	47 (87)	*7 (13)
4. Peri-surgically, a patient with diabetes type 1 or 2 should be treated with intravenous insulin.	*29 (53.7)	19 (35.2)
5. Type 1 diabetic patients who are eating should have their blood glucose monitored 6-hourly.	23 (42.6)	*29 (53.7)
6. A sliding scale is the best way of deciding how much insulin a diabetic patient needs.	32 (59.3)	*21 (38.9)
7. Insulin adjustments should be made according to an adjustment scale for all eating patients on insulin in hospital.	*29 (53.7)	16 (29.6)
8. Long-acting insulin is contraindicated in all patients admitted to hospital who are eating.	3 (5.6)	*42 (77.8)
9. Patients with type 1 diabetes always need some insulin irrespective of whether they are eating or not.	*36 (66.7)	17 (31.5)
10. Combination insulins (e.g. Actraphane and Humulin 30/70) are not suitable for use in a diabetic patient admitted to hospital.	6 (11.1)	*38 (70.4)

The most correct answers are indicated by an asterisk (*).

Table IV. Nurses' practical knowledge questions

Question	True (%)	False (%)
1. Do you consider a patient to be hypoglycaemic if blood glucose is 2.9 mmol/l?	*51 (83)	6 (9.8)
2. The best schedule to monitor blood glucose is a day profile (before and 2 hours after each meal and at 22h00).	*35 (57.4)	14 (23)
3. Is a blood glucose level of 8.3 mmol/l acceptable for a diabetic patient?	*39 (63)	19 (31.1)
4. Are diabetic patients more prone to develop complications than non-diabetic patients while in hospital?	*39 (63.9)	18 (29.5)
5. The forearm is the best place to inject insulin.	17 (27.9)	*42 (68.9)
6. An insulin adjustment scale is the dose of insulin to be given in addition to the usual insulin dose, and is determined by pre-meal blood glucose.	*43 (70.5)	6 (9.8)
7. Protaphane can be injected intravenously.	1 (1.6)	*40 (65.6)
8. To test capillary blood glucose, the side of the finger is the best place to do the finger-prick.	*53 (88.5)	3 (4.9)
9. Patients who are not eating should not receive boli of insulin, but rather insulin infusions.	*38 (62.3)	6 (9.8)

Regarding inpatient monitoring of blood glucose, the majority (44%) of doctors prescribed 4-hourly monitoring, and only 15% proposed meal-related monitoring.

Concerning target blood glucose in inpatients, answers varied from 3 to 11 mmol/l; 11 (20.4%) respondents stated 4 mmol/l; 9 (16%) said 7 mmol/l; 8 (15%) said 10 mmol/l; and 7 (13%) each said 5 and 8 mmol/l.

On the question of the insulin dose for a patient not usually treated with insulin, but who now needs insulin in hospital, 19 (35%) of doctors would calculate the dose according to the patient's weight, while 32 (59%) would put the patient on an insulin sliding scale to see how much insulin was needed.

Regarding what would be prescribed for a type 2 diabetic patient admitted for an unrelated problem who does not need to be starved and was well

Table V. DAS3 scores for nurses and doctors

Subscale	Nurses (N=61) Median (IQR)/mode	Doctors (N=53) Median (IQR)/mode	All (N=114) Median (IQR)/mode	p Mann-Whitney/ Kolmogrov
1. Need for special training	4.6 (4.2 - 5.0)/5	4.6 (4.2 - 4.8)/5	4.6 (4.2 - 5.0)/5	0.532 0.937
2. Non-insulin-dependent diabetes is a serious condition	3.71 (3.43 - 4.43)/3.57	4.29 (3.86 - 4.57)/4.57	4 (3.57 - 4.57)/3.57	0.001 0.001
3. The value of tight control	3.57 (3.23 - 3.86)/3.86	3.86 (3.86 - 4.57)/3.86	3.86 (3.43 - 4.29)/3.86	<0.001 <0.001
4. Psychosocial impact of diabetes	3.67 (3.17 - 4.08)/3.83	4.17 (3.83 - 4.33)/4.17	3.83 (3.50 - 4.33)/3.83	<0.001 0.002
5. Patient autonomy	3.75 (3.5 - 4.06)/3.5	3.62 (3.31 - 4.12)/3.38	3.62 (3.37 - 4.12)/3.5	0.728 0.587

Score: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree
IQR = interquartile range.

Table VI. Scoring in DAS3 subscales

Subscale	Score	Nurses (N=61) N (%)	Doctors (N=53) N (%)	All (N=114) N (%)
1. Need for special training	1	0 (0)	1 (1.9)	1 (0.09)
	2	2 (3.3)	0 (0)	2 (1.7)
	3	2 (3.3)	2 (3.7)	4 (3.5)
	4	6 (9.8)	8 (14.8)	14 (12.2)
	5	51 (83.6)	42 (77.8)	93 (80.9)
2. Non-insulin-dependent diabetes is a serious condition	1	0 (0)	0 (0)	0 (0)
	2	1 (1.6)	0 (0)	1 (0.9)
	3	6 (9.8)	3 (5.6)	9 (7.8)
	4	34 (55.7)	15 (27.8)	49 (42.6)
	5	20 (32.8)	35 (64.8)	55 (47.8)
3. The value of tight control	1	0 (0)	0 (0)	0 (0)
	2	0 (0)	2 (3.7)	2 (1.7)
	3	9 (14.8)	1 (1.9)	10 (8.7)
	4	45 (73.8)	19 (35.2)	64 (55.7)
	5	7 (11.5)	31 (57.4)	38 (33.0)
4. Psychosocial impact of diabetes	1	0 (0)	2 (3.7)	2 (1.7)
	2	1 (1.6)	0 (0)	1 (0.9)
	3	11 (18.0)	2 (3.7)	13 (11.3)
	4	34 (55.7)	22 (40.7)	56 (48.7)
	5	15 (24.6)	27 (50.0)	42 (36.5)
5. Patient autonomy	1	0 (0)	0 (0)	0 (0)
	2	0 (0)	2 (3.7)	2 (1.7)
	3	7 (11.5)	3 (5.6)	10 (8.7)
	4	39 (63.9)	34 (63.0)	73 (63.5)
	5	15 (24.6)	14 (25.9)	29 (25.2)

Score: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree.

controlled at home on oral medication, only 38 (70%) of respondents would continue home medication, 8 (15%) would continue home medication and start a sliding scale, and 6 (11%) would stop oral medication and continue with a sliding scale only.

On being asked what would be prescribed for a type 1 diabetic patient admitted for a unrelated problem who can eat in hospital and was well controlled at home on twice-daily mixed insulin, 39 (72%) of respondents

would continue home treatment, 5 (9%) would continue with home treatment but add a sliding scale, and 7 (13%) would stop the usual home regimen and start on a sliding scale only.

On the question of what would be prescribed for a type 2 diabetic patient admitted to hospital, on oral agents only before admission, and not allowed to eat, 34 (63%) of doctors would stop oral agents and start on a 4-hourly sliding scale and a continuous dextrose

infusion, 7 (13%) would start an insulin infusion, and 9 (17%) would continue with oral agents and start a dextrose infusion.

On what would be prescribed for a type 2 diabetic patient, on oral agents and twice-daily mixed insulin, admitted to hospital and who needs to be starved, 10 (18.5%) would stop all usual treatment and initiate an insulin sliding scale and a dextrose infusion; 30 (56%) would start with a sliding scale only; 6 (11.1%) would start an insulin infusion as well as a dextrose infusion; and 4 (7.4%) admitted that they did not know.

For the true/false section, the mean score was 4.94 (SD 1.59), median 5 (IQR 4 - 6) out of a potential 10. The highest score was 9, achieved by only 1 doctor. The results of the above true/false section based on more practical applications correlates with the 3 equivalent (therapy-related) sections of the O'Brien questionnaire (Diabetes medications, Insulin use, and Surgery and fasting in diabetes) ($r=0.384$, $p=0.005$).

Additional, more problem-based, questions were put to all nurses to assess their practical knowledge of diabetes.

When the same aspects were probed for in open questions, responses were as follows:

On asking what would be the ideal frequency of blood glucose testing in the ward, only 17 (27%) indicated that it should be done in relation to meals; this is in keeping with the doctors' responses.

Regarding which are the best body sites to inject insulin, 22 (36%) thought it was the forearm, 50 (82%) the thigh, 53 (87%) the abdomen, and 4 (7%) the upper arm.

About the symptoms of hypoglycaemia, 12 (20%) mentioned sweaty cold skin, 3 (5%) dizziness, 9 (15%) confusion or delirium, 11 (18%) coma or loss of consciousness, 3 (5%) restlessness, and 7 (11%) wrongly stated thirst. Thirty-five (57%) considered that a blood glucose less than 3 mmol/l is hypoglycaemic. In response to hypoglycaemia, 34 (56%) stated an appropriate action.

Concerning the difference between a sliding scale and a supplementation scale, 50 (82%) did not know that supplementation scale should be related to meals.

On asking which insulins can be given intravenously, 37 (61%) responded correctly – regular insulin.

From the DAS 3 questionnaire, it appears that nearly all medical and nursing staff are aware of and realise the need for special training in the management of diabetic patients (median score 4.6, mode 5). No difference could be indicated in their attitude towards the need for diabetes training between doctors and nurses. Regarding the four other parameters, the

attitude towards diabetic patients was less strong (medians: 3.86, 3.86, 3.83 and 3.62). It seems that doctors are more aware than nurses of the seriousness of type 2 diabetes, the value of tight glycaemic control, and the psychosocial impact of diabetes on patients. This was indicated by the significant difference in mean DAS3 scores for the mentioned parameters ($p=0.001$, <0.001 and <0.001 respectively). Regarding patient autonomy in the management of their disease, both nurses and doctors felt equally strongly.

Discussion

The survey group comprised doctors and nurses working in a large secondary hospital in the government sector. It was found that these doctors, who care for mostly uninsured patients, have insufficient knowledge especially in three aspects of diabetes care for inpatients:

1. Firstly, knowledge of the use of diabetic medication seems to be inadequate, with a median score of 2 out of 5.
2. Secondly, knowledge of insulin use is lacking, with a median score of 2 out of 6. This deficit in knowledge was also apparent in the questionnaire on diabetes management, in which the median score was 5 out of a possible 10. The same can be concluded from the open practical diabetes management questions.
3. Thirdly, doctors have poor knowledge on dietary management of diabetes, with a median score of 3 out of 6. In comparison with the nurses, doctors tended to have better knowledge of the physiology of diabetes but, for all the other aspects of inpatient diabetes care, were no better than the nursing staff. The mean total score was, however, significantly higher in doctors than in nurses – 68.3% v. 53.9%, with a difference of 14.4% (95% CI, 9.12 - 19.68, $p<0.001$).

Poor knowledge of diabetes management is not an unusual finding in health care providers, especially in the mostly surgical disciplines. This finding was also demonstrated in the study by Piaggese *et al.* who tested 60 non-diabetological health care providers for knowledge of diabetes care. Prominent in the Piaggese study was the lack of knowledge regarding hypoglycaemia, the use and storage of insulin, and the correct utilisation of glucose test strips; these same aspects were identified in this study as requiring attention.

In comparison with the study by Oosthuizen, the median DAS3 scores are comparable with those of doctors in this study. Both studies indicate that a need for special training exists; furthermore, the poor perception of patient autonomy needs to be addressed.

In comparison with the results of the O'Brien study,¹³ this study seems to have had the same results,

showing poor performance in aspects related to treatment and insulin administration.

This study surveyed only doctors and nurses who were prepared to take part, although an attempt to approach all medical and nursing staff was made. Since participation was voluntary, this study's results may overestimate the knowledge and attitudes of doctors and nurses, owing to volunteer bias.

The major problem identified in this survey is the lack of knowledge of doctors regarding to treatment of diabetic inpatients; this could be addressed by introducing training sessions on diabetes management to all doctors. Alternatively, a specialised diabetes management team could take care of the management of diabetic inpatients concerning diabetes-related problems. A third option is the introduction of standardised diabetic inpatient management protocols that are specific enough to accommodate all the various diabetes inpatient circumstances and that incorporate potential therapies simple enough to be clearly understandable and easy to use.

Conclusion

Diabetes is becoming a very common disease, and increasing numbers of patients suffering from it will be hospitalised, for reasons not always related to diabetes *per se*. All health care providers, irrespective of the discipline they work in, should have a basic

knowledge of how to manage diabetic patients when they are admitted, as a diabetologist or internist will by no means invariably be available to take care of the diabetic aspects of patients. Hospitals should consider appointing dedicated diabetes caregivers for inpatients or the introduction of clear and user-friendly inpatient diabetes management protocols.

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