

# Obstructive sleep apnoea in diabetes - assessment and awareness

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## Abstract

In 2008, the International Diabetes Federation (IDF) Task-force on Epidemiology and Prevention released a consensus statement recommending targeted screening for obstructive sleep apnoea (OSA) in people with obesity and type 2 diabetes with classic OSA symptoms, and screening for diabetes, hypertension and dyslipidaemia in those with OSA. We conducted a survey to gain a greater understanding of current practice in relation to the IDF recommendations for the assessment of patients in diabetes clinics in the UK. An online survey that was made accessible to diabetes healthcare professionals with the support of the websites of several diabetes organisations was performed. Most (approximately two-thirds) of diabetes healthcare professionals who responded to this survey were not aware of the IDF recommendations either for diabetes screening in OSA patients or for OSA assessment in type 2 diabetes and obesity. Participants indicated that their local diabetes guidelines did not incorporate assessment for OSA in those deemed to be at risk. Furthermore, most participants perceived OSA investigations to be primarily the domain of the respiratory team rather than the diabetes team. The observations from this survey provide a better understanding of the application and impact of the IDF guidance in diabetes clinics.

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**Key words:** diabetes, sleep disordered breathing, obesity, obstructive sleep apnoea, sleep apnoea.

## Introduction

Changes in sleep breathing patterns termed SDB are associated with obesity and/or type 2 diabetes. SDB is characterised by a spectrum of altered sleep homeostasis that ranges from simple snoring to OSA with excessive daytime sleepiness. In OSA,

## Abbreviations and acronyms

ABCD	Association of British Clinical Diabetologists
AHI	apnoea-hypopnoea index
CPAP	continuous positive airway pressure
DSNs	diabetes specialist nurses
IDF	International Diabetes Federation
OSA	obstructive sleep apnoea
RCT	randomised controlled trials
SDB	sleep-disordered breathing
YDEF	Young Diabetologist's and Endocrinologist's forum

**Table 1** AHI for diagnosis and classification of OSA<sup>3</sup>

Diagnosis	Events per hour
Normal	<5
Mild OSA	5 - 15
Moderate OSA	15 - 30
Severe OSA	>30

AHI = apnoea-hypopnoea index; OSA = obstructive sleep apnoea

repeated apnoeas or hypopnoeas occur during sleep. An apnoea is defined as the complete cessation of airflow for at least 10 seconds. A hypopnoea is defined as a reduction in airflow that is followed by an arousal from sleep or a decrease in oxyhaemoglobin saturation.<sup>1</sup> Formal polysomnography counts the number of apnoeas and hypopnoeas per hour during sleep and the AHI (frequency of apnoea and/or hypopnoea) is used to diagnose and classify the severity of OSA<sup>2</sup> (Table 1). The frequency of oxygen desaturation episodes and severity of somnolence symptoms are also used.<sup>4</sup>

The estimated prevalence of moderate to severe OSA is 13% in men and 6% in women between 30 and 70 years.<sup>5</sup> The major risk factors for OSA are obesity, gender and increasing age,<sup>6</sup> and OSA is associated with a clustering of clinical cardio-metabolic manifestations including hypertension and type 2 diabetes. In OSA recurrent episodes of upper airway obstruction and changes in intra-thoracic pressure result in recurrent periodic oxygen desaturations, with frequent sleep arousals and fragmented sleep.<sup>7,8</sup>

It has been estimated that up to 40% of OSA patients will have diabetes,<sup>9</sup> and in patients with diabetes the prevalence of OSA may be up to 23%.<sup>10</sup> Prevalence estimates of OSA in severe obesity have been reported to be 40-90%.<sup>11</sup> Patients may be unaware of the association between OSA and type 2 diabetes. The symptoms and signs of OSA may not be perceived relevant to their

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diabetes care, thus their OSA may remain unreported and undiagnosed.

The relationship of OSA with type 2 diabetes has important implications for improving health outcomes given the worldwide prevalence of diabetes mellitus - predicted to increase from 8.3% in 2013 to 10.1% in 2035 when patient numbers are expected to reach 592 million.<sup>12</sup> Despite the absence of RCT data supporting cardiovascular risk reduction with CPAP treatment, we know that cardiovascular disease risk is increased in OSA.<sup>13</sup> There is also evidence that OSA may be associated with microvascular complications such as diabetic retinopathy,<sup>14</sup> nephropathy<sup>15</sup> and neuropathy.<sup>16</sup>

In 2008, the IDF Taskforce on Epidemiology and Prevention released a consensus statement that recommended a targeted approach to screen individuals with type 2 diabetes and obesity for SDB.<sup>17,18</sup> Briefly, the IDF recommended that healthcare professionals should consider the possibility of OSA in patients with type 2 diabetes and work in tandem with the local sleep service to provide a clinically appropriate process of assessment, referral and intervention.<sup>18</sup>

The purpose of this survey was to gain a greater understanding of current practice in relation to the IDF recommendations for assessment of OSA in patients attending diabetes clinics.

## Methods

An online survey open to all health professionals caring for patients with diabetes in the UK was conducted for four months (December 2013 to March 2014). Data were collected using a questionnaire consisting of seven questions designed in light of the IDF statement (Table 2). The survey was publicly announced on the ABCD and Diabetes UK websites and in the Diabetes UK professional newsletter (Update, December 2013), and on the YDEF website which provided the links to access the online survey. In order to maintain confidentiality all responses were anonymous.

The first two sections of the questionnaire sought to determine demographic data (location of provision of diabetes care and role of the respondent). Questions 1 and 2 aimed to gauge current awareness of the IDF guidance; question 3 to investigate adoption of the IDF recommendations by local diabetes pathways;

questions 4 and 5 ascertained the perceived roles for investigating OSA in diabetes patients.

## Results

A total of 62 responses were received, mainly from hospital-based physicians (Figure 1), and showed that a minority of respondents were aware of the IDF guidelines and their implications for practice, but 78% of respondents noted that diabetes patients with suspected OSA are investigated by the respiratory team (Table 3). Appendix 1 (available online at [www.bjvd.com](http://www.bjvd.com)) documents questionnaire responses according to role and location. It is noteworthy that all respondents did not answer all questions.

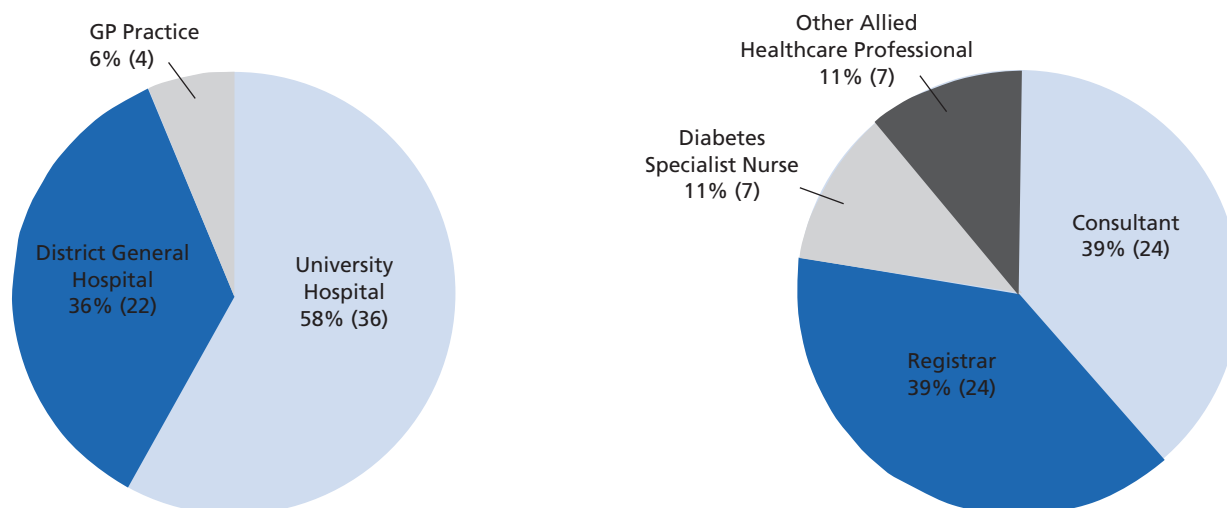
## Discussion

The majority (approximately two-thirds) of diabetes healthcare professionals who responded to this survey were not aware of the IDF recommendations either for diabetes screening in OSA patients or for OSA assessment in type 2 diabetes and obesity. Secondly, most participants indicated that their local diabetes guidelines did not incorporate assessment for OSA in those deemed to be at risk. Thirdly, for the vast majority of participants, assessments were deemed to be primarily the domain of the respiratory team and not the diabetes team.

A beneficial effect of OSA treatment with CPAP in terms of blood pressure reduction was found in patients with type 2 diabetes,<sup>19</sup> although the research on the influence of CPAP therapy on glucose homeostasis has yielded mixed findings.<sup>20</sup> Nevertheless, it has been proposed that there may be a role for a multifaceted approach for these individuals in order to manage their cardio-metabolic risks.<sup>21</sup> A recent observational study of OSA patients with type 2 diabetes assessed clinical outcomes and cost-effectiveness of CPAP treatment compared with non-treatment. It was found that CPAP use was associated with significantly lower blood pressure, improved glycaemic control, and was more cost-effective than no treatment with CPAP,<sup>22</sup> and a strategy has been proposed to identify, screen and diagnose patients with type 2 diabetes and OSA.<sup>23</sup>

**Table 2** Questionnaire on OSA assessment

Please tick the relevant boxes.						
Location:	Teaching/University Hospital	<input type="checkbox"/>	District General Hospital	<input type="checkbox"/>	GP Practice	<input type="checkbox"/>
Role:	Consultant	<input type="checkbox"/>	Registrar	<input type="checkbox"/>	Diabetes Specialist Nurse	<input type="checkbox"/>
					<b>Y</b>	<b>N</b>
						<b>Don't Know</b>
1.	I know IDF guidance to screen for diabetes in OSA?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	I know IDF guidance to screen for OSA in high risk patients with diabetes & obesity?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	Our local diabetes guidelines recommend OSA screening in diabetes patients at risk of OSA?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	Local people with diabetes suspected of OSA are investigated by diabetes team?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	Local people with diabetes suspected of OSA are investigated by respiratory team?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Figure 1.** Questionnaire results showing location of work and role of respondents (n= 62).**Table 3** Responses to questions 1-5. Total number of respondents = 62\*

Question	Responses		
	Yes	No	Don't know
1. I know IDF guidance to screen for diabetes in OSA?	32% (n=19)	38% (n=23)	30% (n=18)
2. I know IDF guidance to screen for OSA in high risk patients with diabetes & obesity?	34% (n=21)	38% (n=23)	28% (n=17)
3. Our local diabetes guidelines recommend OSA screening in diabetes patients at risk of OSA?	19% (n=12)	45% (n=28)	36% (n=22)
4. Local people with diabetes suspected of OSA are investigated by diabetes team?	12% (n=7)	67% (n=40)	21% (n=13)
5. Local people with diabetes suspected of OSA are investigated by respiratory team?	78% (n=48)	3% (n=2)	19% (n=12)

\*Some respondents did not answer all questions: 2 skipped question 1; 1 skipped question 2; 2 skipped question 4.

The Epworth Sleepiness scale is a validated questionnaire to assess the severity of sleepiness symptoms and is a simple screening tool that could be used for patients suspected of SDB. However, it should be borne in mind that although hypersomnolence symptoms may relate to micro-arousals and to changes in sleep architecture, it is non-specific and not always associated with OSA. Therefore it is not sufficiently discriminating to diagnose OSA.<sup>24</sup> Depending on services available, a referral for sleep studies or to the relevant sleep team for further assessment may be necessary. Lifestyle recommendations such as weight reduction for overweight or obese patients, smoking cessation, avoidance of sedatives, decreasing alcohol consumption and proper sleep hygiene may be recommended.

The treatment of OSA aims to reduce daytime sleepiness. CPAP is recommended as a treatment option for individuals with moderate or severe symptomatic OSA given the effects on blood

pressure, implications for quality of life and driving safety.<sup>25</sup> There is evidence that non-sleepy OSA patients treated with CPAP have not shown effective decreases in blood pressure and it is possible that non-sleepy asymptomatic OSA patients may face a different level of risk from those who are sleepy.<sup>26</sup>

This study has several limitations. Despite public announcements of the survey and engaging the help of organisations including the ABCD, the YDEF and Diabetes UK, which has an estimated 6,000 professional members (Richard Elliot, Personal Communication, 17 June 2014), there were only 62 respondents, so there is likely to be a significant non-response bias given the limited sample size. A higher response rate using a validated questionnaire would increase confidence in the generalisability of the findings.

Nevertheless awareness of OSA and taking it into consideration as part of our holistic patient assessment are very important.



### Key messages

- OSA is a common co-morbidity in diabetes and obesity
- A history of snoring, excessive daytime somnolence and witnessed apnoeic events may be suggestive of OSA
- A pro-active approach is encouraged to identify patients at risk of OSA

### Conflict of interest

None

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## Appendix 1.

**Questionnaire results by role and location of respondents**

Role and location	No of respondents
Consultant DGH	9
Consultant Uni Hosp	15
Registrar DGH	10
Registrar University Hosp	14
DSN DGH	1
DSN University Hospital	4
DSN GP Practice	2
AHP University Hospital	3
AHP DGH	2
AHP GP Practice	2
<b>Total</b>	<b>62</b>

**Q1 Awareness of IDF guidance to screen for diabetes in people with OSA**

Role and location	Yes	No	Don't Know	Skipped
Consultant DGH	5	2	2	0
Consultant Uni Hosp	7	3	4	1
Registrar DGH	1	7	1	1
Registrar Uni Hosp	2	5	7	0
DSN DGH	0	0	1	0
DSN Uni Hosp	1	2	1	0
DSN GP Prac	1	0	1	0
AHP Uni Hosp	0	2	1	0
AHP DGH	2	0	0	0
AHP GP Prac	0	2	0	0
<b>Total</b>	<b>19</b>	<b>23</b>	<b>18</b>	<b>2</b>

**Q2 Awareness of IDF guidance to screen at-risk patients with diabetes & obesity for OSA**

Role and location	Yes	No	Don't Know	Skipped
Consultant DGH	5	2	2	0
Consultant Uni Hosp	4	5	5	1
Registrar DGH	2	6	2	0
Registrar Uni Hosp	4	6	4	0
DSN DGH	0	0	1	0
DSN Uni Hosp	2	1	1	0
DSN GP Prac	2	0	0	0
AHP Uni Hosp	0	2	1	0
AHP DGH	2	0	0	0
AHP GP Prac	0	1	1	0
<b>Total</b>	<b>21</b>	<b>23</b>	<b>17</b>	<b>1</b>

**Q3 Do local diabetes guidelines recommend OSA screening in diabetes patients at-risk of OSA?**

Role and location	Yes	No	Don't Know	Skipped
Consultant DGH	1	5	3	0
Consultant Uni Hosp	1	9	5	0
Registrar DGH	2	6	2	0
Registrar Uni Hosp	5	4	5	0
DSN DGH	0	1	0	0
DSN Uni Hosp	0	2	2	0
DSN GP Prac	1	0	1	0
AHP Uni Hosp	1	0	2	0
AHP DGH	1	0	1	0
AHP GP Prac	0	1	1	0
<b>Total</b>	<b>12</b>	<b>28</b>	<b>22</b>	<b>0</b>

**Q4 Are patients with diabetes suspected of OSA investigated by the diabetes team?**

Role and location	Yes	No	Don't Know	Skipped
Consultant DGH	2	6	0	1
Consultant Uni Hosp	1	14	0	0
Registrar DGH	0	8	2	0
Registrar Uni Hosp	3	8	2	1
DSN DGH	0	1	0	0
DSN Uni Hosp	1	1	2	0
DSN GP Prac	0	0	2	0
AHP Uni Hosp	0	0	3	0
AHP DGH	0	1	1	0
AHP GP Prac	0	1	1	0
<b>Total</b>	<b>7</b>	<b>40</b>	<b>13</b>	<b>2</b>

**Q5 Are patients with diabetes suspected of OSA investigated by the respiratory team?**

Role and location	Yes	No	Don't Know	Skipped
Consultant DGH	7	2	0	0
Consultant Uni Hosp	13	0	2	0
Registrar DGH	9	0	1	0
Registrar Uni Hosp	12	0	2	0
DSN DGH	1	0	0	0
DSN Uni Hosp	2	0	2	0
DSN GP Prac	1	0	1	0
AHP Uni Hosp	1	0	2	0
AHP DGH	1	0	1	0
AHP GP Prac	1	0	1	0
<b>Total</b>	<b>48</b>	<b>2</b>	<b>12</b>	<b>0</b>

Key: DGH: District General Hospital, Uni Hosp: University Hospital, AHP: allied health professional, GP Prac: GP Practice, DSN: Diabetes Specialist Nurse.