AUDIT, RESEARCH AND GUIDELINE UPDATE

Variability in clinicians' opinions regarding fitness to drive in patients with obstructive sleep apnoea syndrome (OSAS)

A Dwarakanath,[1] M Twiddy,[2] D Ghosh,[1] S L Jamson,[3] P D Baxter,[4] M W Elliott,[1] on behalf of the British Thoracic Society

▸ Additional material is published online only. To view please visit the journal online (http://dx.doi.org/10.1136/thoraxjnl-2014-206180).

[1]Department of Respiratory Medicine, St. James's University Hospital, Leeds Teaching Hospitals NHS Trust, Leeds, UK
[2]Leeds Institute of Health Sciences, University of Leeds, Leeds, UK
[3]Safety and Technology Group, Institute for Transport Studies, University of Leeds, Leeds, UK
[4]Division of Epidemiology & Biostatistics, LICAMM, University of Leeds, Leeds, UK

Correspondence to
Dr Mark W Elliott, Department of Respiratory Medicine, Sleep and Non-invasive Ventilation Service, St James University Hospital, Beckett Street, Leeds LS9 7TF, UK; mark.elliott2@nhs.net

Received 18 August 2014
Revised 17 October 2014
Accepted 30 October 2014
Published Online First 19 November 2014

ABSTRACT

We evaluated clinicians' current practice for giving advice to patients with obstructive sleep apnoea syndrome. Clinicians were invited to complete a web-based survey and indicate the advice they would give to patients in a number of scenarios about driving; they were also asked what they considered to be residual drowsiness and adequate compliance following CPAP treatment. In the least contentious scenario, 94% of clinicians would allow driving; in the most contentious a patient had a 50% chance of being allowed to drive. Following treatment with CPAP, clinicians' interpretation of what constituted residual drowsiness was inconsistent. In each vignette the same clinician was more likely to say 'yes' to 'excessive' than to 'irresistible' (71%±12% vs 42% ±10%, p=0.0045). There was also a lack of consensus regarding 'adequate CPAP compliance'; 'yes' responses ranged from 13% to 64%. There is a need for clearer guidance; a recent update to the Driver and Vehicle Licensing Agency guidance, and a statement from the British Thoracic Society, making it clear that sleepiness while driving is the key issue, may help.

INTRODUCTION

Obstructive sleep apnoea syndrome (OSAS) is a well-recognised cause of road traffic accidents (RTAs).[1] A meta-analysis has shown that OSAS carries the highest risk for RTAs among a variety of medical conditions.[2] Clinicians diagnosing OSAS are required to advise patients about driving, with an obligation to discourage those patients from continuing to drive who are at high risk of causing an accident or to report them to the Driver and Vehicle Licensing Agency (DVLA). The clinician also has a responsibility to recognise that suspension of driving will have major implications for many; an overcautious approach can cause considerable mobility difficulties for patients. Furthermore, clinicians are often asked by the DVLA and employers to make recommendations about a patient's fitness to drive (details of DVLA regulations are provided in the online supplement). We carried out a survey to gauge the advice patients are likely to be given by clinicians about driving.

METHODS

Subjects

Clinicians were invited to participate in a web-based survey, conducted by the British Thoracic Society (BTS) in collaboration with the British Sleep Society (BSS) and the Association for Respiratory Technology and Physiology (ARTP, UK).

Survey questionnaire

The survey was divided into two parts. The first was completed by all the respondents and included six vignettes that presented a variety of patients with OSAS. For each the respondent chose from one of five recommendations regarding the patient's driving ranging from no restriction to advising not to drive at all. The second part was limited to clinicians who completed DVLA medical forms (SL2C (standard) and SL2VC (vocational)). Respondents were presented with further vignettes of patients who had been offered CPAP, focusing on the questions posed by the DVLA. Additional information was requested, including on the use of objective tests for assessing fitness to drive. Three sleep specialists from the BTS Specialist Advisory Group reviewed the vignettes and confirmed that they were reflective of everyday clinical practice. Respondents were reminded twice to answer as if there was a real patient before them and not how they thought they would be expected to respond.

Primary objective

To assess the degree of variation in advice a patient with OSAS might receive in everyday clinical practice at diagnosis and after starting CPAP.

Secondary objectives

To establish which factors, if any, influenced the advice given, to evaluate the use of objective tests in assessing fitness to drive and whether clinicians report patients to the DVLA.

Statistical analysis

The statistical analysis was carried out using Graph Pad Prism 6 software (San Diego, California, USA) and SPSS (V.20). Statistical significance was set at $p<0.05$. χ^2 tests were used to evaluate which factors influenced the advice given. As the respondents were matched pairs of subjects, McNemar's test was used to establish the significant difference in the residual drowsiness. Binary logistic regression analysis was performed to estimate associations.

RESULTS

Approximately 3150 members of the BTS, BSS and ARTP were invited to complete the survey only if they see patients with OSAS. Four hundred and

To cite: Dwarakanath A, Twiddy M, Ghosh D, *et al*. *Thorax* 2015;**70**:495–497.

Thorax: first published as 10.1136/thoraxjnl-2014-206180 on 19 November 2014. Downloaded from http://thorax.bmj.com/ on April 9, 2024 by guest. Protected by copyright.

sixty-seven (15%) respondents completed the first stage of the survey, 210 said they completed forms for the DVLA and of these 178 completed the second stage. The demographics of the respondents are described in the online supplement where the vignettes are also presented and more details about the results provided.

Advice given at diagnosis of OSAS

There was wide variability in the advice given by the clinicians in all the six vignettes. To a patient, what matters is whether driving is permitted or not, so for ease of presentation and analysis, responses such as 'would not give advice' and 'other' are omitted. Respondents who provided these responses were specialist nurses or non-medically qualified professionals including sleep physiologists. Conflicting advice was given by different clinicians for each vignette. In the least contentious (vignette 1) 94% of clinicians would allow driving. In the most contentious (vignette 3) a patient had a 50% chance of being allowed to drive.

Female clinicians were more likely to allow patients to drive, significant in three out of six vignettes. Clinicians with a special interest in sleep medicine were more likely to allow patients to drive compared with clinicians with no special interest, significant in three out of six vignettes.

Advice given following treatment with CPAP

Two hundred and ten (45%) clinicians completed forms for the DVLA: 178 were analysed after 32 responses were excluded as the questions were unanswered or were incomplete.

CPAP compliance

Across the vignettes there was disagreement between clinicians regarding whether they felt the patient was compliant with CPAP; 'yes' responses ranged from 13% to 64% (table 1).

Residual drowsiness

The DVLA forms enquire whether the patient still suffers from 'irresistible' (SL2C) or 'excessive' (SL2VC) drowsiness. There was inconsistency in the clinicians' assessment of residual drowsiness. The advice depended on whether the word 'irresistible' or 'excessive' was used on the DVLA form. In each vignette, the same clinician was more likely to say 'yes' to 'excessive' than to 'irresistible' (71%±12% vs 42±10%, p=0.0045; table 1).

Drivers reported to the DVLA

Seventy-four per cent of the clinicians who completed the second part of the survey had never reported patients to the DVLA, 23% had reported one to four times and 3% had reported more than five times.

Use of objective tests

One per cent of clinicians always and 4% frequently use objective tests to help in their assessment. Professional drivers are more likely to undergo objective tests than non-professional drivers (52% vs 38%, p=0.0002, OR 1.75).

DISCUSSION

This survey has shown that there is considerable variability in clinicians' opinions regarding whether a patient with OSAS should drive or not. The vignettes were deliberately chosen to be contentious; less variability may have been seen if less contentious vignettes had been presented. However, all were within the range of what is seen regularly in sleep clinics. Although the response rate of 15% appears low, it should be stressed that those who received the e-mail were told they should only complete the survey if they saw patients with OSAS and advised them about driving; for reference, 538 BTS members indicate that sleep medicine is one of their three specialty interests. In the European Respiratory Society, there are 461 members affiliated to group 4.02 (sleep and control of breathing) as their main group, among which 27 are from UK. We believe, therefore, that the survey results are reflective of the views of clinicians working in this field.

Objective tests are seldom used, and while it could be argued that this is because of lack of access, there is little evidence that these tests are useful in determining whether a patient is safe to drive or not. The lack of reliable objective tests means that the clinician is dependent on the account given by the patient. Clinicians do not appear to differentiate between sleepiness generally and specifically while driving; a number of vignettes (7, 9, 10 and 11) described patients with general sleepiness, but who denied problems while driving. Guidance from the American

Table 1 The key factors in the vignettes of patients after CPAP treatment and the McNemar's test showing significant variability in what a patient will be told by the same clinician depending on whether the Driver and Vehicle Licensing Agency (DVLA) form asks about 'irresistible' or 'excessive' drowsiness

Vignette	Pre CPAP AHI	Pre CPAP ESS	Post CPAP AHI	Post CPAP ESS	CPAP use	Other factors	'Compliance' 'Yes'	'Excessive' 'Yes'	'Irresistible' 'Yes'	McNemar's test p Value	McNemar's test OR (95% CI)
7	35/h	22	10	14	3.2 h	Had stopped driving (his decision) but has now restarted	38 (21%)	116 (65%)	46 (26%)	<0.001	6.8 (3.7 to 13.7)
8	28/h	15	3	5	6 h	Does not use CPAP during weekend	65 (37%)	94 (53%)	69 (39%)	0.0009	2.3 (1.4 to 4.1)
9	45/h	14	7	9	4 h	Does not use CPAP for 2 days in a week	45 (25%)	128 (72%)	92 (52%)	<0.001	2.7 (1.6 to 4.7)
10	80/h	22	10	12	N/A	No longer having any problems driving but continues to fall asleep watching television, while reading and if a passenger in a car	114 (64%)	140 (79%)	77 (43%)	<0.001	6.7 (3.5 to 14)
11	35/h	13	Nil	12	N/A	Intolerant to CPAP, lifestyle modifications, weight loss 4 kg	24 (13%)	151(85%)	87(49%)	<0.001	13.8 (5 to 43)

AHI, apnoea/hypopnoea index; ESS, Epworth sleepiness scale.

Thorax: first published as 10.1136/thoraxjnl-2014-206180 on 19 November 2014. Downloaded from http://thorax.bmj.com/ on April 9, 2024 by guest. Protected by copyright.

Thoracic Society[3] suggests that moderate or severe drowsiness during everyday activities and a history of accidents or near misses in the 'recent' past are 'so compelling that the physician is obliged to intervene'. The DVLA is concerned specifically with sleepiness while driving and updated guidance from the BTS and the DVLA, published since this survey was completed, makes this clearer.[4]

What constitutes adequate compliance with CPAP and residual drowsiness are both contentious. Clinicians are more likely to consider drowsiness 'excessive' (vocational form) than 'irresistible' (standard form) consistent with a higher standard being applied to vocational drivers, as intended by the DVLA.

The DVLA is the ultimate arbiter of whether an individual can hold a license or not, but they are heavily dependent on the advice given by clinicians. Under measures currently being considered by the European Union,[5] drivers will be asked questions which raise the possibility of a diagnosis of OSAS as part of the licensing and relicensing process. If the answers to these questions suggest OSAS, patients will be given a restricted license unless a clinician states otherwise. This will place responsibility very clearly with the clinician. Depriving an individual of their license has major implications for them and society. That this decision may be so dependent on which clinician the patient sees is not acceptable. Clear guidance should be given. This must make it clear that moderate or severe sleepiness, particularly while driving (this is made clear in the more recent guidance from the DVLA), and a history of accidents or near misses in the recent past are key issues[3] and what is meant by 'adequate compliance' with treatment.

Research needs to be directed towards a better understanding of what factors in OSAS impair driving performance, how these can be assessed and the development and use of objective tests which can inform decision making and lead to greater consistency. If not patients will lose confidence in a process that is inconsistent and therefore unfair.

Contributors AD: design of study, data collection, analysis and writing the paper. MT: design of the study, analysis and writing the paper. DG, SLJ: design of study and writing the paper. PDB: statistical analysis and writing the paper. MWE: original concept, design of study, analysis and writing the paper.

Competing interests None.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

1 George CF, Smiley A. Sleep apnoea and automobile crashes. *Sleep* 1999;22:790–5.
2 Vaa T. Summary: impairments, diseases, age and their relative risks of accident involvement: results from a meta analysis. *TØI report 690/2003*. Oslo, Institute of Transport Economics, 2003. *Eur Respir Mon* 2010;50:216–24.
3 Strohl KP, Brown DB, Collop N, *et al*. An official American thoracic society clinical practice guideline: sleep apnoea, sleepiness, and driving risk in non commercial drivers. *Am J Respir Cric Care Med* 2013;187:1259–66.
4 BTS Position Statement on Driving and Obstructive Sleep Apnoea (OSA)/Obstructive Sleep Apnoea Syndrome (OSAS), June 2014. https://www.brit-thoracic.org.uk/clinical-information/sleep-apnoea
5 Rodenstein D. Driving in Europe: the need of a common policy for drivers with obstructive sleep apnoea syndrome. *J Sleep Res* 2008;17:281–4.

Thorax: first published as 10.1136/thoraxjnl-2014-206180 on 19 November 2014. Downloaded from http://thorax.bmj.com/ on April 9, 2024 by guest. Protected by copyright.

Variability in clinicians' opinions regarding fitness to drive in patients with Obstructive Sleep Apnoea Syndrome (OSAS)

ONLINE SUPPLEMENT

A Dwarakanath[1], M Twiddy[2], D Ghosh[1], S L Jamson[3], P D Baxter[4], M W Elliott[1] on behalf of the British Thoracic Society.

[1]- St. James's University Hospital, Leeds Teaching Hospitals NHS Trust, UK
[2]- Leeds Institute of Health Sciences, University of Leeds, UK
[3]- Institute for Transport Studies, University of Leeds, UK
[4]- Division of Epidemiology & Biostatistics, LICAMM, University of Leeds, UK

OSAS and Driving Vehicle Licensing Authority (DVLA)- The current state of affairs

Undiagnosed and untreated OSAS is not compatible with safe driving and poses a serious public health concern with respect to road safety. The increased risk of RTA has prompted a specific consideration to OSA in the framework of the legislation for driving licences. Currently in the UK, the Driving Vehicle Licensing Authority (DVLA) has guidelines that are applicable to all drivers who have OSAS. The current guidelines are as follows.

* Cars and motorcycles (Group 1 entitlement)

Driving must stop if there is obstructive sleep apnoea syndrome and symptoms including excessive daytime sleepiness severe enough to impair safe driving. Driving will again be permitted when satisfactory control of the symptoms has been achieved. Patients have to complete the SL 1 form.

* Lorries and buses (Group 2 entitlement)

Driving must stop if there is obstructive sleep apnoea syndrome and symptoms including excessive daytime sleepiness severe enough to likely impair safe driving. Driving will be permitted once satisfactory control of the symptoms has been achieved, together with ongoing compliance with treatment, confirmed by consultant/specialist opinion. Patients have to complete the SLV1 form.

By law, all patients with OSAS should inform the DVLA and complete the relevant form after a diagnosis has been confirmed. Once DVLA is informed, medical

enquiries are undertaken to establish whether the driver should retain their licence. Driving will normally be allowed to continue once satisfactory control of the condition is achieved with CPAP, the gold standard in the management of OSAS.

The onus is on the patient to inform the DVLA themselves. Clinicians should inform the DVLA, having told the patient that they are doing this, only if they have strong reasons to believe both that the patient continues to drive and is at high risk of causing an accident.

At the time the survey was performed the DVLA guidance was not specific about when the patient was sleepy. It has recently been revised to include the words “severe enough to impair safe driving”.

Survey Questionnaire

Part 1 presented six clinical vignettes that were realistic and faced by healthcare professionals in day-to-day clinical practice. Each vignette narrated an OSAS patient who presented with one or more of the following factors; normal or abnormal Epworth Sleepiness Score (ESS); sleepiness specifically while driving, such as episodes of nodding at the wheel or driving on the rumble strip; moderate or severe sleep disordered breathing without significant sleepiness. Respondents were asked to choose one of five options relating to the advice they would give in a real time clinical situation for each of the vignettes.
Part 2 presented further vignettes from patients who had been treated with CPAP and focussed on specific questions asked by the DVLA.

Part-1 Vignettes (all respondents)

1-The patient had a sleep study because of loud snoring. No daytime sleepiness and in particular no problems driving. A sleep study has shown AHI 18 events per hour; the Epworth score is 7. How would you advise the patient about driving?

A- Can drive without restriction, but like anyone else should not drive if feel sleepy
B- Can drive, but should avoid long journeys, motorway driving etc, until satisfactorily treated
C- Should not drive at all, until satisfactorily treated

D- I would not offer the patient any advice about driving
E- Others, please specify

2-The Patient presented to their GP because of loud snoring and concern about occasional witnessed apnoeas. They deny daytime sleepiness and in particular say no problems driving; even long distances. A sleep study has shown AHI 45 events per hour; Epworth score 3. How would you advise the patient about driving?

A- Can drive without restriction, but like anyone else should not drive if feel sleepy
B- Can drive, but should avoid long journeys, motorway driving etc, until satisfactorily treated
C- Should not drive at all, until satisfactorily treated
D- I would not offer the patient any advice about driving
E- Others, please specify

3-Patient consulted GP because of tiredness. GP elicited a history of snoring and questioned possibility of obstructive sleep apnoea. Sleep study: AHI 25 events / hour; Epworth score 15. Says no problems at all with sleepiness while driving- recently drove 4 hours on a motorway without a break and with no problems. How would you advise the patient about driving?

A- Can drive without restriction, but like anyone else should not drive if feel sleepy
B- Can drive, but should avoid long journeys, motorway driving etc, until satisfactorily treated
C- Should not drive at all, until satisfactorily treated
D- I would not offer the patient any advice about driving
E- Others, please specify

4-Patient referred by ENT to whom had presented with troublesome snoring. This was prompted by the partner; patient denies a problem. Sleep study: AHI 17 events / hour; Epworth 17. Shift worker (alternating 4 days 3 nights with breaks between). Patient only falls asleep if relaxing or bored. Never if occupied. Patient says that this is typical of most of work colleagues. Says that has never had any problems driving; apart from once year ago on a very long drive; 10 hours; returning from holiday; when nodded off very briefly. How would you advise the patient about driving?

A- Can drive without restriction, but like anyone else should not drive if feel sleepy
B- Can drive, but should avoid long journeys, motorway driving etc, until satisfactorily treated
C- Should not drive at all, until satisfactorily treated
D- I would not offer the patient any advice about driving
E- Others, please specify

5-A sleep study was performed as part of routine work up of a patient being assessed for bariatric surgery. The patient admits to being "a little sleepy

occasionally" but had not thought much of it until now. They would not have bothered to see their GP about it. During motorway driving gets tired after 1 hour. Has nodded on one occasion a couple of years ago - since then says always stops for a rest as soon as starts to feel tired. Sleep study: AHI 30 events per hour; Epworth 18. How would you advise the patient about driving?

A- Can drive without restriction, but like anyone else should not drive if feel sleepy
B- Can drive, but should avoid long journeys, motorway driving etc, until satisfactorily treated
C- Should not drive at all, until satisfactorily treated
D- I would not offer the patient any advice about driving
E- Others, please specify

6-AHI 55 events per hour; Epworth score 18. Patient denies any problems driving but then recounts a recent journey on a motorway during which describes nodding at the wheel and hitting the rumble strip on several occasions. Says it was a one off after an early start; a much longer drive than does normally and a particularly hard day's work. Says does not normally drive on motorways; driving usually confined to maximum 20 minutes to and from work; to shops etc. How would you advise the patient about driving?

A- Can drive without restriction, but like anyone else should not drive if feel sleepy
B- Can drive, but should avoid long journeys, motorway driving etc, until satisfactorily treated
C- Should not drive at all, until satisfactorily treated
D- I would not offer the patient any advice about driving
E- Others, please specify

Part-2 Vignettes (Only for clinicians completing DVLA forms)

The DVLA forms sometimes ask about "irresistible" and sometimes about "excessive" drowsiness and about whether the patient is adequately compliant with treatment. We would like you to answer these questions for each of the following patients PLEASE ANSWER ALL QUESTIONS AS IF THIS WAS A REAL PATIENT - SAY WHAT YOU WOULD DO IN EVERYDAY CLINICAL PRACTICE.

1- Patient with AHI 35/hr Epworth 22. Now established on CPAP. Recent AHI 10/hr on CPAP - machine used 7 hours that night. Epworth 14. Patient says feels much better and that he is no longer having problems driving. He does still fall asleep watching television in the evening, but not at other times. A download from the machine reveals that he is using it for an average of 3.2 hours per night with a range of 0 to 7 hours. He had stopped driving (his decision) but has now restarted.

A- Is the patient adequately compliant with treatment-?
Yes/ No

B- Does the patient continue to experience irresistible drowsiness-?
Yes/No

C- Does the patient continue to experience excessive drowsiness-?
Yes/No

2- At diagnosis - AHI 28 events per hour, Epworth 15. On CPAP AHI 3, Epworth 5. Average use 6 hours per night. Patient regularly spends weekends in a caravan, a 3 hour drive away. Does not use CPAP in caravan because there is no electricity and admits to sometimes feeling drowsy at the wheel returning home on Sunday night. His partner does not drive.

A- Is the patient adequately compliant with treatment-?
Yes/ No

B- Does the patient continue to experience irresistible drowsiness-?
Yes/No

C- Does the patient continue to experience excessive drowsiness-?
Yes/No

3- Diagnostic AHI 45 events / hr, Epworth 14. Now established on CPAP AHI 7 Epworth 9. Average use 4 hours per night, but wide range. Usually does not use at all two nights per week. The days following a night without CPAP admits to falling asleep during breaks at work, but says has no problems driving.

A- Is the patient adequately compliant with treatment-?
Yes/ No

B- Does the patient continue to experience irresistible drowsiness-?
Yes/No

C- Does the patient continue to experience excessive drowsiness-?
Yes/No

4- Diagnostic AHI 80 events per hour, Epworth 22, patient admitted falling asleep regularly while driving. On CPAP AHI 10 events per hour Epworth 12. Says feels much better and no longer having any problems driving but continues to fall asleep watching television, while reading and if a passenger in a car.

A- Is the patient adequately compliant with treatment-?
Yes/ No

B- Does the patient continue to experience irresistible drowsiness-?
Yes/No

C- Does the patient continue to experience excessive drowsiness-?

Yes/No

5- Patient with AHI 35 events/hour, Epworth score 13. Prior to diagnosis the patient admits that continued to drive despite regularly nodding at the wheel, because "had to". On a couple of occasions had found himself driving over the rumble strip onto the hard shoulder. Tried CPAP but could not tolerate it at all. Has decided to lose weight and has lost 3 kg so far over two months. Says feels better. Epworth score is 12. There is a moderate chance of dozing or falling asleep watching TV, reading, sitting quietly after lunch, lying down for a rest in the afternoon and as a passenger in a car for an hour without a break. Says that has now realised the importance of not driving when tired and whenever starts to feel tired always stops for a rest and a cup of coffee. Says that since tried CPAP has never nodded while driving nor driven over the rumble strip.

A- Is the patient adequately compliant with treatment-?
Yes/ No

B- Does the patient continue to experience irresistible drowsiness-?
Yes/No

C- Does the patient continue to experience excessive drowsiness-?
Yes/No

RESULTS

Demographics (Table-2)

Table-2, Respondents demographics (n = 467)

Professional background	
Sleep Consultant	109 (23%)
Non Sleep Consultant	138 (30%)
Specialist Trainee	103 (22%)
General Practitioner	3 (1%)
Nurse	44 (9%)
Physiologist	48 (10%)
Others	22 (5%)
Gender	
Male	272 (58%)
Female	195 (42%)
OSAS patients seen per month	
None	21 (4%)
1-5/month	167 (36%)
6-20/month	119 (26%)
> 20/month	160 (34%)
Age of the respondents	
Less than 35 Years	115 (24%)
36-50 Years	251 (54%)
More than 50 Years	101 (22%)
Region of Work	
Northern Ireland	6 (2%)
Wales	17 (3%)
East Of England	23 (5%)
South East Coast	23 (5%)
South Central	25(5%)
North East	34 (7%)
East Midlands	32 (7%)
Scotland	31 (7%)
West Midlands	36 (8%)
South West	46 (10%)
North West	50 (11%)
London	63 (13%)
Yorkshire and Humber	81 (17%)

Advice given at diagnosis of OSAS

There was wide variability in the advice given in all the six vignettes (Figure 1).

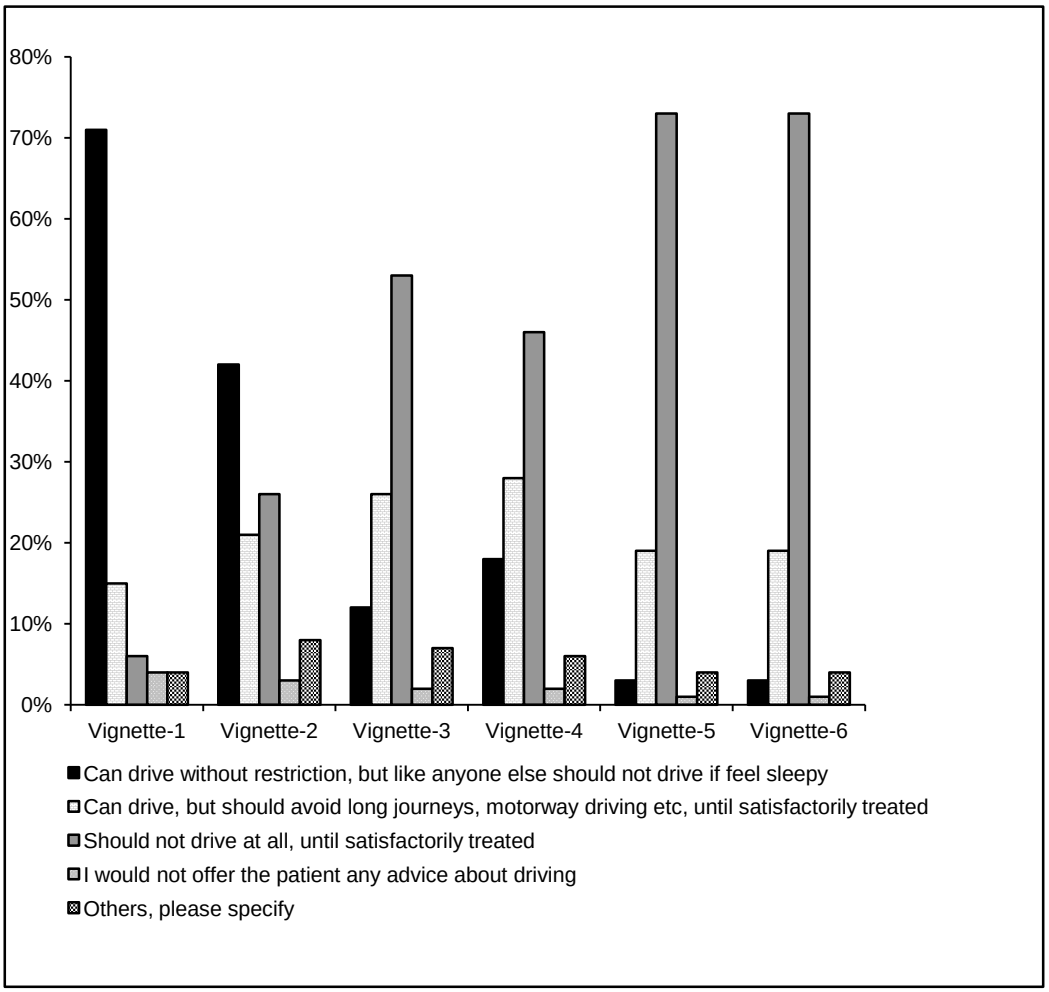

Figure-1, showing the variability in the advice given by the respondents in each of the six vignettes.

To a patient what matters is whether driving is permitted or not. For this reason, and for subsequent ease of presentation and analysis, responses “would not give advice” or “other” are omitted and data presented in Table 3 as “yes” would allow driving [no restriction (option 1) and would allow driving but should avoid long journeys and motorways (option 2)] versus “no” should not drive at all (option 3). Respondents who chose “would not give advice” and “other” were specialist nurses and non-medically qualified professionals including sleep physiologists.

Conflicting advice was given by different clinicians for each vignette. In the least contentious (vignette-1) 94% of clinicians would allow driving. In the most contentious (vignette-3) a patient had a 50% chance of being allowed to drive.

Table 3 - The percentage of patients who would be advised they could and could not drive. Key information from each vignette is also presented.

Vignette	ESS	Any Sleepiness while driving	AHI	Other Factors	"Yes" (%)	"No" (%)	"Yes" (%) 95% CI	"No" (%) 95% CI
1	7	Nil	18/hr	Nil	94%	6%	92%-96%	4%-8%
2	3	Nil	45/hr	Nil	71%	29%	61%-81%	19%-39%
3	15	Nil	25/hr	Nil	42%	58%	32%-52%	48%-68%
4	17	Nodded briefly	17/hr	Shift worker	50%	50%	40%-60%	40%-60%
5	18	Nodded Once	30/hr	Bariatric surgery assessment	23%	77%	15%-31%	69%-85%
6	18	Nodded, hit rumble strip	55/hr	Nil	13%	87%	9%-17%	83%-91%

ESS- Epworth Sleepiness Score, AHI- Apnoea/Hypopnoea index, 95% CI- Confidence interval

Reasons for variability

A- Gender

There was a statistically significant difference in the driving advice given in vignettes 2 to 5 respectively depending on the gender of the respondent (Table-4). Female clinicians are more likely than male clinicians to advise patients to continue driving.

Table-4, Chi square test showing the gender variation in various clinical vignettes.

Vignette	Females "Can Drive"	Females "Cannot Drive"	Males "Can Drive"	Males "Cannot Drive"	P- Value	OR (95% CI)
1	161 (95%)	9 (5%)	233 (94%)	16 (6%)	0.63	1.22 (0.5-2.8)
2	105 (66%)	55 (33%)	185 (75%)	62 (25%)	**0.04**	**0.63 (0.4-0.9)**
3	84 (49%)	89 (51%)	89 (36%)	155 (64%)	**0.01**	**1.64 (1.1-2.4)**
4	101 (59%)	73 (41%)	114 (45%)	139 (55%)	**0.008**	**1.68 (1.1-2.4)**
5	50 (27%)	132 (73%)	50 (19%)	209 (81%)	**0.04**	**1.58 (1.0-2.4)**
6	29 (16%)	155 (84%)	31 12%)	234 (88%)	0.21	1.41 (0.8-2.4)

B- Professional background

Consultants with a special interest in sleep medicine are more likely to advise patients to continue driving in vignettes 2, 5 and 6 respectively when compared to those without a special interest in sleep medicine (Table-5). However there was no difference in the advice given when the consultant grade was compared to non consultant grade (trainees, general practitioner and allied health care professionals) (Table-6).

Table-5, Chi square test showing the difference in advice given in various clinical vignettes between sleep and non sleep consultants.

Vignette	Sleep Consultant "Can Drive"	Sleep Consultant "Cannot Drive"	Non Sleep Consultant "Can Drive"	Non Sleep Consultant "Cannot Drive"	P- Value	OR (95% CI)
1	94 (94%)	7 (6%)	116 (94%)	7 (6%)	0.70	0.81 (0.2-2.3)
2	75 (83%)	15 (17%)	81 (64%)	45 (36%)	**0.002**	**2.7 (1.4-5.3)**
3	39 (41%)	56 (59%)	43 (35%)	80 (65%)	0.35	1.2 (0.74-2.2)
4	47 (48%)	50 (52%)	58 (47%)	65 (53%)	0.84	1.0 (0.61-1.7)
5	29 (29%)	71 (71%)	21 (13%)	107 (87%)	**0.02**	**2.08 (1.1-3.9)**
6	18 (19%)	85 (81%)	10 (8%)	121 (92%)	**0.02**	**2.5 (1.1-5.8)**

Table-6, Chi square test showing the difference in advice given between consultants and other health care professionals in various clinical vignettes.

Vignette	Consultant "Can Drive"	Consultant "Cannot Drive"	Non Consultant "Can Drive"	Non Consultant "Cannot Drive"	P- Value	OR (95%CI)
1	210 (94%)	14 (6%)	156 (95%)	9 (5%)	0.74	0.86 (0.36-2.0)
2	156 (72%)	60 (28%)	116 (71%)	47 (29%)	0.82	1.05 (0.67-1.6)
3	82 (38%)	136 (62%)	61 (41%)	87 (59%)	0.48	0.85 (0.56-1.3)
4	105 (48%)	115 (52%)	94 (55%)	77 (45%)	0.15	0.74 (0.5-1.1)
5	50 (22%)	178 (78%)	42 (24%)	131 (76%)	0.57	0.87 (0.54-1.3)
6	28 (12%)	206 (88%)	25 (14%)	150 (86%)	0.48	0.81 (0.45-1.4)

C- Number of Patients seen

The advice given to OSAS patients was dependent on the number of patients seen per month by the clinician. Respondents who saw more than 5 patients per month were more likely to advise patients to continue driving compared to those who saw less than 5 patients per month. This was statistically significant in vignette 2 and 6 respectively (Table-7).

Table-7, Chi square test showing the differing advice given in various clinical vignettes depending on the number of patients seen per month by the health care professionals.

Vignette	> 5/month "Can Drive"	> 5/month "Cannot Drive"	< 5/month "Can Drive"	<5/month "Cannot Drive"	P- Value	OR (95% CI)
1	238 (95%)	13 (5%)	154 (92%)	12 (8%)	0.38	1.4 (0.6-3.2)
2	183 (87%)	57 (13%)	108 (64%)	59 (36%)	**0.01**	**1.7 (1.1-2.7)**
3	110 (45%)	136 (55%)	63 (37%)	108 (63%)	0.10	1.3 (0.9-2.0)
4	121 (49%)	128 (51%)	94 (53%)	84 (47%)	0.39	0.8 (0.5-1.2)
5	64 (25%)	193 (75%)	36 (20%)	148(80%)	0.18	1.3 (0.8-2.1)
6	41 (15%)	225 (85%)	16 (8%)	168 (92%)	**0.03**	**1.9 (1.0-3.5)**

OR- Odds ratio, 95% CI- 95% Confidence Interval.

D- Age of the clinicians

The advice given to the patients was not dependent on the age of the clinicians. This was not significant in all the vignettes (Table-8).

Table-8 Chi square test showing no difference among the age group of the clinicians and the advice given

Vignette-1	Less than 35 Years	36-50 Years	More than 50 Years	P- Value
Can Drive	95 (98%)	94 (92%)	91 (93%)	0.16
Cannot Drive	2 (2%)	8 (8%)	7 (7%)	
Vignette-2				
Can Drive	69 (76%)	69 (69%)	70 (73%)	0.56
Cannot Drive	22 (24%)	31 (31%)	26 (27%)	
Vignette-3				
Can Drive	41 (44%)	42 (42%)	35 (36%)	0.51
Cannot Drive	52 (56%)	59 (59%)	62 (64%)	
Vignette-4				
Can Drive	52 (54%)	53 (51%)	56 (56%)	0.81
Cannot Drive	45 (46%)	50 (49%)	44 (44%)	
Vignette-5				
Can Drive	23 (23%)	23 (22%)	25 (25%)	0.88
Cannot Drive	76 (76%)	82 (78%)	76 (75%)	
Vignette-6				
Can Drive	15 (16%)	14 (13%)	10 (10%)	0.42
Cannot Drive	85 (85%)	93 (87%)	93 (90%)	

Advice given following treatment with CPAP

210 (45%) of clinicians completed forms for the DVLA. 32 responses were excluded as the questions were unanswered or were incomplete leaving 178 responses for analysis.

Residual Drowsiness

The DVLA forms enquire whether the patient still suffers from “irresistible” (SL2C) or “excessive” (SL2VC) drowsiness. There was inconsistency in the clinicians’ assessment of residual drowsiness when completing the form. The advice depended on the choice of words “irresistible” and “excessive” on the DVLA form. In each vignette the same clinician was more likely to say “yes” to “excessive” than to “irresistible” (71+/12% v/s 42+/-10%, P-0.0045) (Table-9).

Table 9,- The key factors in the vignettes of patients after CPAP treatment and the McNemar's test showing significant variability in what a patient will be told by the same clinician depending on whether the DVLA form asks about "irresistible" or "excessive" drowsiness.

Vignette	Pre CPAP AHI	Pre CPAP ESS	Post CPAP AHI	Post CPAP ESS	CPAP use	Other factors	"Excessive" "Yes"	"Irresistible" "Yes"	McNemar's Test	
									P-value	OR (95% CI)
7	35/hr	22	10	14	3.2 hr	Had stopped driving (his decision) but has now restarted	116(65%)	46(26%)	<0.0001	6.8(3.7-13.7)
8	28/hr	15	3	5	6 hr	Does not use CPAP during weekend	94 (53%)	69(39%)	0.0009	2.3 (1.4-4.1)
9	45/hr	14	7	9	4 hr	Does not use CPAP for 2 days in a week	128(72%)	92(52%)	<0.0001	2.7 (1.6-4.7)
10	80/hr	22	10	12	N/A	No longer having any problems driving but continues to fall asleep watching television, while reading and if a passenger in a car.	140(79%)	77(43%)	<0.0001	6.7(3.5-14)
11	35/hr	13	Nil	12	N/A	Intolerant to CPAP, lifestyle modifications, weight loss 4 kilograms	151(85%)	87(49%)	<0.0001	13.8 (5-43)

CPAP- continuous positive airway pressure, AHI- Apnoea/hypopnoea index, ESS- Epworth sleepiness scale, OR- odds ratio, CI- confidence interval

CPAP Compliance

Across the vignettes there was a disagreement between clinicians regarding what constituted adequate compliance with CPAP (Figure 2); "yes" responses ranged from 13% to 64%.

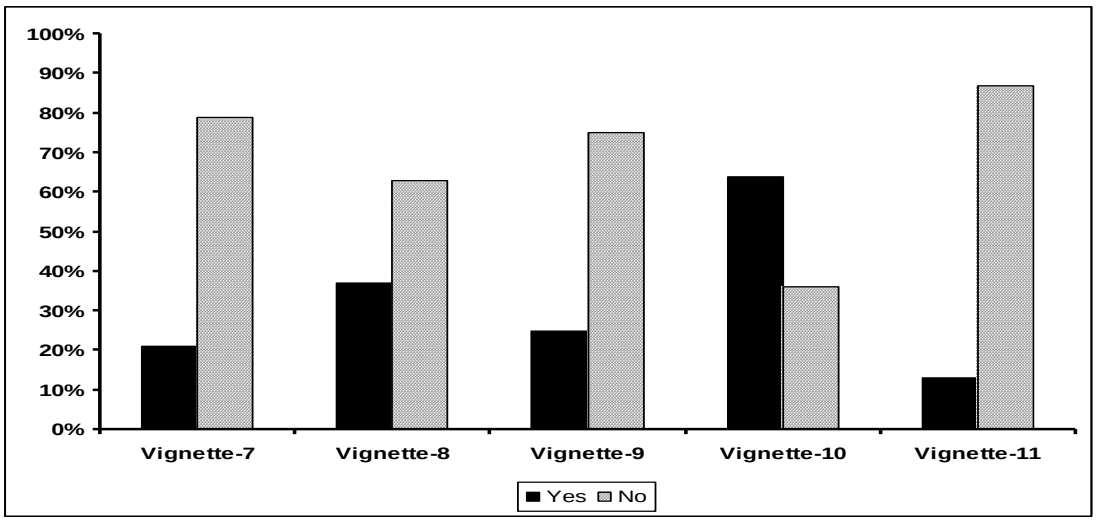

Figure-2 showing the lack of agreement regarding adequate CPAP compliance in the various vignettes.

Drivers reported to the DVLA

131 (74%) of the clinicians who completed the DVLA form had never reported patients to the DVLA, 42 (23%) had reported 1-4 times and 5 (3%) had reported more than 5 times.

Influence of sleepiness in different situations

Respondents were asked to weigh the value given to ESS, description of general sleepiness and sleepiness specifically whilst driving when assessing a patient's fitness for driving. On average clinicians gave equal importance to all three but with a wide range (Table- 10).

Table 10 - Influence of sleepiness contributing to the clinicians' assessment of driving fitness in OSAS patients.

	Median	Inter Quartile Range	Range
ESS	3	2-4	0-10
General Sleepiness	3	2-4	0-7
Sleepiness whilst Driving	3	2-4	0-7

Use of Objective Tests

1% of clinicians always and 4% frequently use objective tests to help in their assessment. Professional drivers are more likely to undergo objective tests than non professional drivers (52% v/s 38%, P-0.0002, OR-1.75) (Table 11).

Table 11 - Current practice of using objective tests by the clinicians' prior giving advice to patients regarding driving

	MSLT	MWT	OSLER	DADS
Never	123 (69%)	133 (75%)	131 (74%)	165 (93%)
Occasionally	52 (29%)	39 (22%)	39 (21%)	11 (6%)
Frequently	3 (2%)	4 (2%)	7 (4%)	2 (1%)
Always	0 (0%)	2 (1%)	1 (1%)	0 (0%)
	HGV	**Taxi**	**High mileage**	**Others**
Never	79 (44%)	92 (52%)	107 (60%)	113 (63%)
Occasionally	62 (35%)	53 (30%)	52 (29%)	49 (27%)
Frequently	17 (10%)	16 (9%)	8 (4%)	8 (5%)
Always	20 (11%)	17 (9%)	11 (7%)	8(5%)

MSLT- multiple sleep latency test, MWT- maintenance of wakefulness test, OSLER- oxford sleep resistance test, DADS- divided attention driving simulator. HGV- Heavy Goods Vehicle.