OSA Reference Material

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Decision Considerations
Disease Protocols – Obstructive Sleep Apnea

Sleep apnea has significant safety implications due to cognitive impairment secondary to the lack of restorative sleep and is disqualifying for airman medical certification. The condition is part of a group of sleep disorders with varied etiologies. Specifically, sleep apneas are characterized by abnormal respiration during sleep. The etiology may be obstructive, central or complex in nature. However, no matter the cause, the manifestations of this disordered breathing present safety risks that include, but are not limited to, excessive daytime sleepiness (daytime hypersomnolence), cardiac dysrhythmia, sudden cardiac death, personality disturbances, refractory hypertension and, as mentioned above, cognitive impairment. Certification may be considered once effective treatment is shown.

This protocol is designed to evaluate airmen who may be presently at risk for Obstructive Sleep Apnea (OSA) and to outline the certification requirements for airmen diagnosed with OSA. While this protocol focuses on OSA, the AME must also be mindful of other sleep-related disorders such as insomnia, parasomnias, sleep-related movement disorders (e.g., restless leg syndrome and periodic leg movement), central sleep apnea and other hypersomnias, circadian rhythm sleep disorders, etc., that may also interfere with restorative sleep. All sleep disorders are also potentially medically disqualifying if left untreated. If one of these other sleep-related disorders is initially identified during the examination, the AME must contact their RFS or AMCD for guidance.

Risk Information

The American Academy of Sleep Medicine has established the risk criteria (utilizing Tables 2 and 3) for OSA. When applying Table 2 and 3, the AME is expected to employ their clinical judgment.

Educational information for airmen can be found in the FAA Pilot Safety Brochure on Obstructive Sleep Apnea.

Persons with physical findings such as a retrograde mandible, large tongue or tonsils, neuromuscular disorders, or connective tissue anomalies are at risk of OSA requiring treatment despite a normal or low BMI. OSA is also associated with conditions such as refractory hypertension requiring more than two medications for control, diabetes mellitus, and atrial fibrillation. Over 90% of individuals with a BMI of 40 or greater have OSA requiring treatment. Up to 30% of individuals with OSA have a BMI less than 30.

SLEEP APNEA
All Classes

DISEASE/CONDITION	EVALUATION DATA	DISPOSITION
Obstructive Sleep Apnea	Requires risk evaluation, per OSA Protocol. Document history and Findings.	If meets OSA Criteria – Issue, if otherwise qualified **Initial Special Issuance** - Requires FAA Decision **Follow-up Special Issuance** See AASI
Periodic Limb Movement, etc.	Submit all pertinent medical information and current status report. Include sleep study with a polysomnogram, use of medications and titration study results, along with a statement regarding Restless Leg Syndrome.	Requires FAA Decision

OSA QUICK-START for the AME

The AME while performing the triage function must conclude one of six possible determinations. The AME is **not** required to perform the assessment or to comment on the presence or absence of OSA. (For more information on this process, an instructional video is available.)

Step 1 - Determine into which group (1-6) the airman falls.

Applicant Previously Assessed:
Group 1: Has OSA diagnosis and is on Special Issuance. Reports to follow.
Group 2: Has OSA diagnosis OR has had previous OSA assessment. NOT on Special Issuance. Reports to follow.

Applicant Not at Risk:
Group 3: Determined to NOT be at risk for OSA at this examination.

Applicant at Risk/Severity to be assessed:
Group 4: Discuss OSA risk with airman and provide educational materials.
Group 5: At risk for OSA. AASM sleep apnea assessment required.

Applicant Risk/Severity Extremely High:
Group 6: Deferred. Immediate safety risk. AASM sleep apnea assessment required. Reports to follow.

Step 2 – Document findings in Block 60.

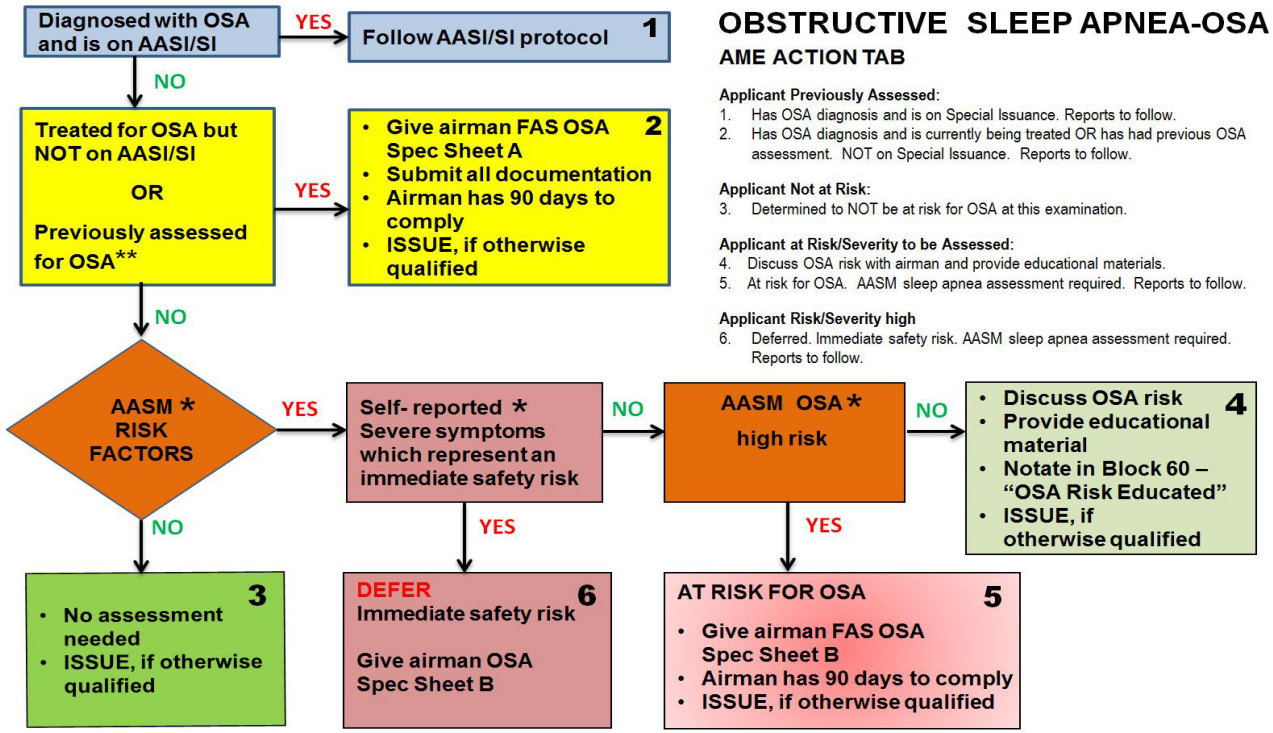
Step 3 – Check appropriate triage box in the AME Action Tab.

Step 4 – Issue, if otherwise qualified.

In assessing airmen for groups 4 and 5, the AME is expected to use their own clinical judgment, using AASM information, when making the triage decision.

Some AMEs have voiced the desire to perform the OSA assessment. **While we do not recommend it**, the AME may perform the OSA assessment provided that it is in accordance with the clinical practice guidelines established by the American Academy of Sleep Medicine.*

*If a sleep study is conducted, it must be interpreted by a sleep medicine specialist.



OBSTRUCTIVE SLEEP APNEA-OSA

AME ACTION TAB

Applicant Previously Assessed:

1. Has OSA diagnosis and is on Special Issuance. Reports to follow.
2. Has OSA diagnosis and is currently being treated OR has had previous OSA assessment. NOT on Special Issuance. Reports to follow.

Applicant Not at Risk:

3. Determined to NOT be at risk for OSA at this examination.

Applicant at Risk/Severity to be Assessed:

4. Discuss OSA risk with airman and provide educational materials.
5. At risk for OSA. AASM sleep apnea assessment required. Reports to follow.

Applicant Risk/Severity high

6. Deferred. Immediate safety risk. AASM sleep apnea assessment required. Reports to follow.

* See AASM Tables 2 and 3. AME must use clinical judgment in applying AASM criteria. The risk of OSA is determined by an integrated assessment of history, symptoms, and physical/clinical findings. No disqualification of airmen should be based on BMI alone.

** If the applicant has been previously assessed, has previously provided the information, was negative for evidence of OSA, AND has no changes in risk factors since the last exam, proceed with the flow chart as with any other applicant.

American Academy of Sleep Medicine
Guidance on Obstructive Sleep Apnea
http://www.aasmnet.org/Resources/clinicalguidelines/OSA_Adults.pdf

AASM Table 2

Patients at High Risk for OSA Who Should Be Evaluated for OSA Symptoms:

- Obesity (BMI > 35)
- Congestive heart failure
- Atrial fibrillation
- Treatment refractory hypertension
- Type 2 diabetes
- Nocturnal dysrhythmias
- Stroke
- Pulmonary hypertension
- High-risk driving populations
- Preoperative for bariatric surgery

AASM Table 3

Questions about OSA that Should Be Included in Routine Health Maintenance Evaluations:

- Is the patient obese?
- Is the patient retrognathic?
- Does the patient complain of daytime sleepiness?
- Does the patient snore?
- Does the patient have hypertension?

A. AME Actions - On every exam, the Examiner must triage the applicant into one of 6 groups:

- If the applicant is on a Special Issuance Authorization for OSA (**Group/Box 1 of OSA flow chart)**, select Group 1 on the AME Action Tab:
    - Follow AASI for OSA
    - Notate in Block 60; and
    - Issue, if otherwise qualified

- If the applicant has had a prior OSA assessment (**Group/Box 2 of OSA flow chart**), select Group 2 on the AME Action Tab:

    - If the airman is under treatment, provide the requirements of the AASI and advise the airman they must get the Authorization of Special Issuance;
    - Give the applicant Specification Sheet A and advise that a letter will be sent from the Federal Air Surgeon requesting more information. The letter will state that the applicant has 90 days to provide the information to the FAA/AME;
    - Notate in Box 60;
    - Issue, if otherwise qualified

- If the applicant does not have an AASI/SI or has not had a previous assessment, the AME must:

    - Calculate BMI; and
    - Consider AASM risk criteria Table 2 & 3
    - If the AME determines the applicant is not currently at risk for OSA (**Group/Box 3 of OSA flow chart**), select Group 3 on the AME Action Tab:
        - Notate in Block 60; and
        - Issue, if otherwise qualified

    - If the applicant is at risk for OSA but in the opinion of the AME the applicant is at low risk for OSA , the AME must (**Group/Box 4 of OSA flow chart**), select Group 4 on the AME Action Tab:

        - Discuss OSA risks with applicant;
        - Provide resource and educational information, as appropriate;
        - Notate in Block 60; and
        - Issue, if otherwise qualified

- If the applicant is at high risk for OSA, the AME must (**Group/Box 5 of OSA flow chart**), select Group 5 on the AME Action Tab:

    - Give the applicant Specification Sheet B and advise that a letter will be sent from the Federal Air Surgeon requesting more information. The letter will state that the applicant has 90 days to provide the information to the FAA/AME
    - Notate in Block 60; and
    - Issue, if otherwise qualified

- If the AME observes or the applicant reports symptoms which are severe enough to represent an immediate risk to aviation safety of the national airspace (**Group/Box 6 of OSA flow chart),** select Group 6 on the AME Action Tab.

    - Notate in Block 60
    - **THE AME MUST DEFER**

Obstructive Sleep Apnea Specification Sheet A
Information Request

Your application for airman medical certification submitted this date indicates that you have been treated or previously assessed for Obstructive Sleep Apnea (OSA).

You must provide the following information to the Aerospace Medical Certification Division (AMCD) or your Regional Flight Surgeon within 90 days:

- All reports and records regarding your assessment for OSA by your primary care physician and/or a sleep specialist.
- If you are currently being treated, also include:
    - A signed Airman Compliance with Treatment form or equivalent;
    - The results and interpretive report of your most recent sleep study; and
    - A current status report from your treating physician indicating that OSA treatment is still effective.
        - **For CPAP/ BIPAP/ APAP:**
          A copy of the cumulative annual PAP device report. Target goal should show use for at least 75% of sleep periods and an average minimum of 6 hours use per sleep period.
        - **For Dental Devices or for Positional Devices:**
          Once Dental Devices with recording / monitoring capability are available, reports must be submitted.
- To expedite the processing of your application, please submit the aforementioned information **in one mailing** using your reference number (PI, MID, or APP ID).

Using Regular Mail (US Postal Service) **or**
Federal Aviation Administration
Aerospace Medical Certification Division AAM-300
Civil Aerospace Medical Institute
PO Box 25082
Oklahoma City, OK 73125-9867

Using Special Mail (FedEx, UPS, etc.)
Federal Aviation Administration
Aerospace Medical Certification Division AAM-300
Civil Aerospace Medical Institute, Bldg. 13
6700 S. MacArthur Blvd., Room 308
Oklahoma City, OK 73169

OBSTRUCTIVE SLEEP APNEA SPECIFICATION SHEET B
ASSESSMENT REQUEST (Updated 06/26/2022)

Due to your risk for Obstructive Sleep Apnea (OSA), and to review your eligibility to have a medical certificate, you must provide the following information to the Aerospace Medical Certification Division (AMCD) or your Regional Flight Surgeon's Office for review within 90 days:

- A current OSA assessment in accordance with the American Academy of Sleep Medicine (AASM) by your AME, personal physician, or a sleep medicine specialist.

- If it is determined that a sleep study is necessary, it must be either a Type I laboratory polysomnography or a Type II (7 channel) unattended home sleep test (HST) that provides comparable data and standards to laboratory diagnostic testing. **It must be interpreted by a sleep medicine specialist and must include diagnosis and recommendation(s) for treatment, if any.**

If your sleep study is **positive for a sleep-related disorder, you may not exercise the privileges of your medical certificate until you provide:**

- A signed Airman Compliance with Treatment form or equivalent;

- The results and interpretive report of your most recent sleep study; and

- A current status report from your treating physician addressing compliance, tolerance of treatment, and resolution of OSA symptoms.

If you are **not diagnosed with a sleep-related disorder or the study was negative for a sleep-related disorder**, you may continue to exercise the privileges of your medical certificate, but the evaluation report along with the results of any study, if conducted, must be sent to the FAA at the address below. All information provided will be reviewed and is subject to further FAA action.

In order to expedite the processing of your application, please submit the aforementioned information **in one mailing** using your reference number (PI, MID, or APP ID).

Using Regular Mail (US Postal Service) **or**
Federal Aviation Administration
Aerospace Medical Certification Division AAM-300
Civil Aerospace Medical Institute
PO Box 25082
Oklahoma City, OK 73125-9867

Using Special Mail (FedEx, UPS, etc.)
Federal Aviation Administration
Aerospace Medical Certification Division AAM-300
Civil Aerospace Medical Institute, Bldg. 13
6700 S. MacArthur Blvd., Room 308
Oklahoma City, OK 73169

AME Assisted - All Classes – Obstructive Sleep Apnea (OSA)

Examiners may re-issue an airman medical certificate to airmen currently on an AASI for OSA **if the airman provides the following:**

- An Authorization granted by the FAA;
- Signed Airman Compliance with Treatment form or equivalent from the airman attesting to absence of OSA symptoms and continued daily use of prescribed therapy; and
- A current status report from the treating physician indicating that OSA treatment is still effective.
    - **For CPAP/ BIPAP/ APAP:**
        - A copy of the cumulative annual PAP device report which shows **actual time used** (rather than a report typically generated for insurance providers which only shows if use is greater or less than 4 hours). Target goal should show use for at least 75% of sleep periods and an average minimum of 6 hours use per sleep period.
        - For persons with an established diagnosis of OSA who do not have a recording CPAP, a one year exception will be allowed to provide a personal statement that they regularly use CPAP and before each shift when performing flight or safety duties.
    - **For Dental Devices and/or for Positional Devices:**
      No conditions known to be co-morbid with OSA (e.g., diabetes mellitus, hypertension treated with more than two medications, atrial fibrillation, etc.). Once Dental Devices with recording / monitoring capability are available, reports must be submitted.
    - **For Surgery:**
      For successfully treated surgical patients, a statement attesting to the continued absence of OSA symptoms is required.

Defer to the AMCD or the Region for further review if:

- Concerns about adequacy of therapy or non-compliance;
- Significant weight gain or development of conditions known to be co-morbid with OSA (e.g., diabetes mellitus, hypertension treated with more than two medications, atrial fibrillation, etc.).

Note: The Examiner may request AMCD review to discontinue the AASI if there are indications that the airman no longer has OSA (e.g., significant weight loss and a negative study or surgical intervention followed by 3 years of symptom abatement and absence of significant weight gain or co-morbid conditions). **In most cases, a follow-up sleep study will be required to remove the AASI.**

AIRMAN COMPLIANCE WITH TREATMENT
OBSTRUCTIVE SLEEP APNEA (OSA)

I _____ (print name) certify that (check one):

___ I have been using _____ (CPAP/ Dental / or Positional Device) for OSA as prescribed. I am tolerating the therapy well and have no symptoms of OSA (e.g., daytime sleepiness or lack of mental attention or concentration).

___ I have been surgically treated for OSA and I have no symptoms of OSA (e.g. daytime sleepiness or lack of mental attention or concentration).

I understand and acknowledge that I will receive the new requirements for continuation of my special issuance of Obstructive Sleep Apnea and I will comply with the requirements at my next FAA medical certificate renewal or reapplication.

Applicant Name: _____

Date of Birth: _____

Reference Number: (PI, MID, or APP ID): _____

Applicant Signature _____ Date _____

OSA – FREQUENTLY ASKED QUESTIONS (FAQS)

(Updated: 02/24/2021)

GENERAL:

1. **Where can I view the video explaining the process?**
   The instructional video for AMEs is available here.

2. **Where can I find the specification sheets and educational material?**
   See OSA reference materials.

3. **Does this process involve other sleep disorder conditions? (e.g., Period Limb Movement Disorder, narcolepsy, central sleep apnea, etc.)**
   No. This process is for obstructive sleep apnea only. If it is clear that the airman suffers from a different sleep disorder, DEFER and submit any supporting documentation for FAA decision.

TRIAGE:

4. **I am not a sleep specialist. How am I supposed to determine if an airman is high risk enough to send for a sleep evaluation? How many risk factors must be present before additional testing is required?**
   The AME should triage the airman based on the FAA OSA Flow Chart, supporting clinical guidelines, and good clinical judgment to determine the appropriate category for the airman.

5. **The airman was assessed 5 years ago for OSA but did not have a polysomnogram. The evaluation was negative. Is he required to have an updated sleep evaluation or a sleep study?**
   No. If there has been NO CHANGE in his/her risk factors, follow Group/Box 2 of the flow chart and submit a copy of the previous assessment. However, if there has been a change in risk factors (e.g., elevated BMI, new atrial fibrillation, refractory hypertension, etc.), triage using the flow chart to determine if the airman needs a repeat assessment.

6. **If I mark the radio button (1-6) and have no concerns, do I still need to put notes in Block 60 regarding the OSA triage?**
   Yes. It is only required for Group/Box 4 to document that education was given. However, it may be useful to document the rationale for triage decisions, especially for Group/Box 2, 5, and 6.

SLEEP EVALUATION AND SLEEP STUDY:

7. **Is a sleep evaluation the same as a sleep study?**
   No. Please reference the AASM guidelines. A sleep evaluation is needed when the triage process

indicates that the airman is at high risk for OSA. The sleep evaluation is used to determine if a sleep study is warranted.

8. **Do I have to turn in the "AME Assessment Statement" for every airman?**
   No. This statement page is only used by an AME who PERFORMS the sleep evaluation (in accordance with AASM guidelines) and finds that the airman does not have evidence of OSA. This is NOT to be used for the routine triage function.

9. **What are the different types of sleep studies?**
   They are:
   - Type I: Attended studies (full polysomnogram [PSG] in a sleep lab.
   - Type II: Unattended (home) studies using the same monitoring sensors as full PSGs (Type I).
   - Type III*: Unattended (home) studies using devices that measure limited cardiopulmonary parameters (two respiratory variables [e.g., effort to breathe, airflow], oxygen saturation, and a cardiac variable [e.g., heart rate or electrocardiogram].
   - Type IV*: Unattended (home) studies using devices that measure only 1 or 2 parameters (typically oxygen saturation and heart rate, or in some cases, just air flow).

   *Please note, Type III and Type IV are **NOT acceptable** for FAA purposes.

10. **Does the FAA require a specific type of sleep study if one is warranted?**
    Yes. The FAA requires that the test be either a Type I laboratory polysomnography or a Type II (7 channel) unattended home sleep test (HST) that provides comparable data and standards to laboratory diagnostic testing. It does not have to be a chain of custody study.

11. **What if the doctor or insurance provider is only willing to do a level III Home Sleep Test (HST)?**
    In communities where a Level II HST is unavailable, the FAA will accept a level III HST. If the HST is positive for OSA, no further testing is necessary and treatment in accordance with the AASI must be followed. However, if the HST is equivocal, a higher-level test such as an in-lab sleep study will be needed unless a sleep medicine specialist determines no further study is necessary and documents the rationale.

12. **If I do the sleep evaluation and determine the airman needs a sleep study, as the AME, can I interpret the sleep study?**
    The AME may only interpret the sleep study if he/she is a sleep medicine specialist.

CERTIFICATE, EXTENSION, AND DENIAL PROCESS:

13. **If an airman is in Group/Box 5 (at risk for OSA) they have 90 days to comply with getting an evaluation. Does the AME issue a time-limited, 90-day certificate?**
    No. Issue a regular (not time limited) certificate, if the airman is otherwise qualified. The AME MAY NOT issue

a time-limited certificate without an authorization from the FAA.

14. **I evaluated the airman and triaged him into Group/ Box 5. He had a sleep study and is doing well on CPAP treatment. Does he have to wait for a time-limited certificate before he can return to flight duties?**
No. Once the airman is compliant with and doing well on treatment, he has met the requirements for 14 CFR 61.53. The airman may return to flight status with the current certificate issued by the AME, PROVIDED that ALL the required information regarding OSA evaluation and treatment has been submitted to the FAA for review.

15. **Once the AME issues a regular certificate, who is responsible for keeping track of the 90 days?**
The FAA will keep track of the 90 days.

16. **The airman has a prior SI/AASI for OSA that only asks for a current status report. Can I issue this year if he does not bring in any other information on the OSA?**
Yes. The AME may issue this year based on the previous SI/AASI if those requirements were met.

17. **Can the airman continue to submit only a current status report until his current AASI expires?**
No. An airman currently on an SI/AASI for OSA will receive a new SI/AASI letter this year. At that point, he/she will have to comply with the new documentation requirements.

18. **What if the airman cannot get a sleep evaluation in 90 days?**
The airman may request a one-time, 30-day extension by phone by calling AMCD at (405) 954-4821 and selecting Option 1 when prompted. They may also mail a request to AMCD (see Specification Sheet B for address) or by contacting their RFS office.

19. **If I give the airman Specification Sheet A or B and he does not submit the required evaluation within 90 days and after the 30-day extension (if requested), what will happen?**
The airman will receive a failure to provide (FTP) denial.

TREATMENT AND FOLLOW UP:

20. **How long does an airman have to be on CPAP with a new diagnosis of OSA before they can return to flying?**
The airman may submit the completed compliance statement and required documents to the FAA for review as soon as they are tolerating the therapy without difficulty and have no symptoms of OSA.

21. **The airman has mild or moderate sleep apnea. Is he required to use CPAP?**
In most cases an AHI of 16 or more will require CPAP.

22. **If the airman has a sleep study and is diagnosed with OSA does he/she get a new certificate?**
Yes. Once a diagnosis of OSA is established, a Special Issuance is required. When the airman submits the required supporting documents to the FAA, he/she will be evaluated for a Special Issuance.

23. **If an airman has a previously unreported history of OSA being treated with CPAP, can the AME issue?**
Yes. Issue a regular certificate (Group/Box 2), if the airman is otherwise qualified, and submit the required information for FAA decision.

24. **What if the airman is high risk and has had a previous sleep study that was positive, but not one of the approved tests? He is currently on CPAP and doing well. Does he have to get a new sleep study?**
Follow Group/Box 2 and submit the required information for FAA decision.

25. **The airman had a sleep study in the past and did not have sleep apnea. It was not an approved test type. Will he have to get another sleep study?**
The AME should follow the triage flow chart. If the airman is determined to be Group/Box 5 or 6, he/she will need a sleep evaluation. If a sleep study is warranted, it will need to be an approved test type (see FAQ #9). Submit the required information for FAA decision.

26. **The airman has OSA and was on CPAP in the past. He has now lost weight and is only on a dental device. What do I do now?**
Follow Group/Box 2 and submit the required information for FAA decision.

Measurement Units	BMI Formula and Calculation
Pounds and inches	Formula: weight (lb) / [height (in)]^2 x 703 Calculate BMI by dividing weight in pounds (lbs) by height in inches (in) squared and multiplying by a conversion factor of 703. Example: Weight = 150 lbs, Height = 5'5" (65") Calculation: [150 ÷ (65)^2] x 703 = 24.96
Kilograms and meters (or centimeters)	Formula: weight (kg) / [height (m)]2 With the metric system, the formula for BMI is weight in kilograms divided by height in meters squared. Since height is commonly measured in centimeters, divide height in centimeters by 100 to obtain height in meters. Example: Weight = 68 kg, Height = 165 cm (1.65 m) Calculation: 68 ÷ (1.65)2 = 24.98

Body Mass Index Table

	Normal						Overweight					Obese										Extreme Obesity																
BMI	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
Height (inches)	Body Weight (pounds)																																			
58	91	96	100	105	110	115	119	124	129	134	138	143	148	153	158	162	167	172	177	181	186	191	196	201	205	210	215	220	224	229	234	239	244	248	253	258
59	94	99	104	109	114	119	124	128	133	138	143	148	153	158	163	168	173	178	183	188	193	198	203	208	212	217	222	227	232	237	242	247	252	257	262	267
60	97	102	107	112	118	123	128	133	138	143	148	153	158	163	168	174	179	184	189	194	199	204	209	215	220	225	230	235	240	245	250	255	261	266	271	276
61	100	106	111	116	122	127	132	137	143	148	153	158	164	169	174	180	185	190	195	201	206	211	217	222	227	232	238	243	248	254	259	264	269	275	280	285
62	104	109	115	120	126	131	136	142	147	153	158	164	169	175	180	186	191	196	202	207	213	218	224	229	235	240	246	251	256	262	267	273	278	284	289	295
63	107	113	118	124	130	135	141	146	152	158	163	169	175	180	186	191	197	203	208	214	220	225	231	237	242	248	254	259	265	270	278	282	287	293	299	304
64	110	116	122	128	134	140	145	151	157	163	169	174	180	186	192	197	204	209	215	221	227	232	238	244	250	256	262	267	273	279	285	291	296	302	308	314
65	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210	216	222	228	234	240	246	252	258	264	270	276	282	288	294	300	306	312	318	324
66	118	124	130	136	142	148	155	161	167	173	179	186	192	198	204	210	216	223	229	235	241	247	253	260	266	272	278	284	291	297	303	309	315	322	328	334
67	121	127	134	140	146	153	159	166	172	178	185	191	198	204	211	217	223	230	236	242	249	255	261	268	274	280	287	293	299	306	312	319	325	331	338	344
68	125	131	138	144	151	158	164	171	177	184	190	197	203	210	216	223	230	236	243	249	256	262	269	276	282	289	295	302	308	315	322	328	335	341	348	354
69	128	135	142	149	155	162	169	176	182	189	196	203	209	216	223	230	236	243	250	257	263	270	277	284	291	297	304	311	318	324	331	338	345	351	358	365
70	132	139	146	153	160	167	174	181	188	195	202	209	216	222	229	236	243	250	257	264	271	278	285	292	299	306	313	320	327	334	341	348	355	362	369	376
71	136	143	150	157	165	172	179	186	193	200	208	215	222	229	236	243	250	257	265	272	279	286	293	301	308	315	322	329	338	343	351	358	365	372	379	386
72	140	147	154	162	169	177	184	191	199	206	213	221	228	235	242	250	258	265	272	279	287	294	302	309	316	324	331	338	346	353	361	368	375	383	390	397
73	144	151	159	166	174	182	189	197	204	212	219	227	235	242	250	257	265	272	280	288	295	302	310	318	325	333	340	348	356	363	371	378	386	393	401	408
74	148	155	163	171	179	186	194	202	210	218	225	233	241	249	256	264	272	280	287	295	303	311	319	326	334	342	350	358	365	373	381	389	396	404	412	420
75	152	160	168	176	184	192	200	208	216	224	232	240	248	256	264	272	279	287	295	303	311	319	327	335	343	351	359	367	375	383	391	399	407	415	423	431
76	156	164	172	180	189	197	205	213	221	230	238	246	254	263	271	279	287	295	304	312	320	328	336	344	353	361	369	377	385	394	402	410	418	426	435	443

Source: Adapted from *Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults: The Evidence Report.*

BERLIN QUESTIONNAIRE©

Height (m) _____ Weight (kg) _____ Age _____

Male / Female

Please choose the correct response to each question.

Category 1	**Category 2**
1. Do you snore? □ a. Yes □ b. No □ c. Don't know *If you answered 'yes':*	**6.** How often do you feel tired or fatigued after your sleep? □ a. Almost every day □ b. 3-4 times per week □ c. 1-2 times per week □ d. 1-2 times per month □ e. Rarely or never
2. Your snoring is: □ a. Slightly louder than breathing □ b. As loud as talking □ c. Louder than talking	**7.** During your waking time, do you feel tired, fatigued or not up to par? □ a. Almost every day □ b. 3-4 times per week □ c. 1-2 times per week □ d. 1-2 times per month □ e. Rarely or never
3. How often do you snore? □ a. Almost every day □ b. 3-4 times per week □ c. 1-2 times per week □ d. 1-2 times per month □ e. Rarely or never	**8.** Have you ever nodded off or fallen asleep while driving a vehicle? □ a. Yes □ b. No *If you answered 'yes':*
4. Has your snoring ever bothered other people? □ a. Yes □ b. No □ c. Don't know	**9. How often does this occur?** □ a. Almost every day □ b. 3-4 times per week □ c. 1-2 times per week □ d. 1-2 times per month □ e. Rarely or never
5. Has anyone noticed that you stop breathing during your sleep? □ a. Almost every day □ b. 3-4 times per week □ c. 1-2 times per week □ d. 1-2 times per month □ □ e. Rarely or never	**Category 3** **10.** Do you have high blood pressure? □ Yes □ No □ Don't know

SCORING BERLIN QUESTIONNAIRE

The questionnaire consists of 3 categories related to the risk of having sleep apnea. Patients can be classified into High Risk or Low Risk based on their responses to the individual items and their overall scores in the symptom categories.

Categories and Scoring:
Category 1: Items 1, 2, 3, 4, and 5;
Item 1: if '**Yes**', assign **1 point**
Item 2: if '**c**' or '**d**' is the response, assign **1 point**
Item 3: if '**a**' or '**b**' is the response, assign **1 point**
Item 4: if '**a**' is the response, assign **1 point**
Item 5: if '**a**' or '**b**' is the response, assign **2 points**
Add points. *Category 1 is positive if the total score is 2 or more points*.

Category 2: items 6, 7, 8 (item 9 should be noted separately).
Item 6: if '**a**' or '**b**' is the response, assign **1 point**
Item 7: if '**a**' or '**b**' is the response, assign **1 point**
Item 8: if '**a**' is the response, assign **1 point**
Add points. *Category 2 is positive if the total score is 2 or more points.*

Category 3 is positive if the answer to item 10 is '**Yes**' or if the BMI of the patient is greater than 30kg/m2.
(BMI is defined as weight (kg) divided by height (m) squared, i.e.., kg/m2).

High Risk: if there are 2 or more categories where the score is positive.
Low Risk: if there is only 1 or no categories where the score is positive.

EPWORTH SLEEPINESS SCALE

The original version of the ESS was first published in 1991. However, it soon became clear that some people did not answer all the questions, for whatever reason. They may not have had much experience in some of the situations described in ESS items, and they may not have been able to provide an accurate assessment of their dozing behavior in those situations. However, if one question is not answered, the whole questionnaire is invalid. It is not possible to interpolate answers, and hence item-scores, for individual items. This meant that up to about 5 % of ESS scores were invalid in some series.

In 1997, an extra sentence of instructions was added to the ESS, as follows:
‘‘It is important that you answer each question as best you can’.

With this exhortation, nearly everyone was able to give an estimate of their dozing behavior in all ESS situations. As a result, the frequency of invalid ESS scores because of missed item- responses was reduced to much less than 1%.

The 1997 version of the ESS is now the standard one for use in English or any other language. It is available in pdf here.

Epworth Sleepiness Scale

Name: _____ Today's date: _____

Your age (Yrs): _____ Your sex (Male = M, Female = F): _____

How likely are you to doze off or fall asleep in the following situations, in contrast to feeling just tired?

This refers to your usual way of life in recent times.

Even if you haven't done some of these things recently try to work out how they would have affected you.

Use the following scale to choose the **most appropriate number** for each situation:

0 = would **never** doze
1 = **slight chance** of dozing
2 = **moderate chance** of dozing
3 = **high chance** of dozing

It is important that you answer each question as best you can.

Situation	Chance of Dozing (0-3)
Sitting and reading	
Watching TV	
Sitting, inactive in a public place (e.g. a theatre or a meeting)	
As a passenger in a car for an hour without a break	
Lying down to rest in the afternoon when circumstances permit	
Sitting and talking to someone	
Sitting quietly after a lunch without alcohol	
In a car, while stopped for a few minutes in the traffic	

THANK YOU FOR YOUR COOPERATION

STOP BANG QUESTIONNAIRE

Height inches/cm:

Age:

Male/Female

BMI: _____

Weight lb./kg:

Collar size of shirt: S, M, L, XL, or inches/cm neck circumference:

1. *S*noring
Do you *s*nore loudly (louder than talking or loud enough to be heard through closed doors)?
Yes No

2. Tired
Do you often feel *t*ired, fatigued, or sleepy during daytime? Yes No

3. *O*bserved - Has anyone *o*bserved you stop breathing during your sleep?
Yes No

4. Blood *p*ressure
Do you have or are you being treated for high blood *p*ressure? Yes No

5. BMI -BMI more than 35 kg/m2?
Yes No

6. *A*ge - *A*ge over 50 years old?
Yes No

7. Neck circumference - Neck circumference greater than 40 cm?
Yes No

8. *G*ender – Male?
Yes No

* Neck circumference is measured by staff

High risk of OSA: answering yes to three or more items
Low risk of OSA: answering yes to less than three items

Adapted from:
STOP Questionnaire
A Tool to Screen Patients for Obstructive Sleep Apnea
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Anesthesiology 2008; 108:812–21

Asleep at the controls

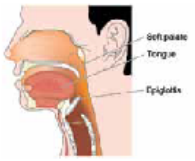
On a daytime flight one February day in 2008, a commercial aircraft with three crewmembers and 40 passengers flew past its destination airport after both the captain and first officer fell asleep. The pilot awoke and turned back to the destination airport, where all deplaned safely - but behind schedule. The National Transportation Safety Board determined that contributing factors to the incident were the captain's undiagnosed obstructive sleep apnea (OSA) and the flight crew's recent work schedules, which included several days of early-morning start times.

An obscure condition tackles a pro lineman

With the shocking death of NFL lineman Reggie White, the problem of OSA was thrust into the limelight. Up to that time, OSA was relatively unknown outside the medical community. Today, OSA is recognized as a major contributor to many possible health-related ailments. In some estimates, it has been suggested that OSA affects-

- 4 - 7% of middle-aged people.
- 70% of clinically obese patients.
- 34% of all NFL lineman.
- 30% - 50% of patients with heart disease.
- 60% of patients suffering strokes.

The pathophysiology of OSA



Apnea is a medical term that means "being without respiration." Obstructive sleep apnea is characterized as a repetitive upper airway obstruction during sleep, as a result of narrowing of the respiratory passages. Most people with this disorder are overweight and have higher deposits of adipose (fatty) tissue in their respiratory passages, and the size of their soft palates and tongues are larger than average. These conditions decrease the size of the upper airway and decrease airway muscle tone, especially when sleeping in the supine (back down and horizontal) position. Gravity can pull tissue down and over the airway, further decreasing its size, impeding air flow to the lungs during inhalation.

The major impact of OSA

Snoring can result when the airway becomes partially obstructed. With further tissue obstruction of the airway, there may be complete occlusion. Whether the obstruction is partial (hypopnea) or total (apnea), the subject struggles to breathe and is aroused from sleep. Often, these sleep interruptions are unrecognized, even if they occur hundreds of times a night. The real danger is that the OSA sufferers may not realize the condition and are only aware that they typically awaken feeling sleepy and tired. Losing sleep is more than a simple inconvenience. Good, sound sleep is essential for good health and clear mental and emotional functioning. Additionally, OSA is associated with a reduction in blood oxygen levels feeding the brain, which, of course, is a major health concern. Repetitive decreases in blood oxygen levels associated with OSA may eventually increase:

- Blood pressure.
- Strain on the cardiovascular system.
- Risk of heart attack.
- Risk of stroke.

A costly problem on the ground

The National Sleep Foundation (NSF) estimates that sleep deprivation and sleep disorders cost Americans more than $100 billion annually in lost productivity, medical expenses, sick leave, and property and environmental damage. In addition, the NSF estimates that -

- About 70 million people in the U.S. have some sort of sleep problem.
- 40 million suffer from chronic sleep disorders.
- As many as 30 million are affected by intermittent, sleep-related problems.

The National Highway Traffic Safety Administration conservatively estimates that -

- 100,000 accidents are caused by drowsy drivers each year, resulting in more than 1,500 fatalities, 71,000 injuries, and $12.5 billion in diminished productivity and property loss.
- People with OSA have a *six times* greater risk factor for automobile accidents.

A potential problem in flight?

The implications for pilots and crewmembers are significant. It has been suggested that people with mild-to-moderate OSA can show performance degradation equivalent to 0.06 to 0.08% blood alcohol levels, which is the measure of *legal intoxication* in most states. Most pilots will not fly intoxicated, but OSA sleep deprivation may be causing the equivalent effects! Further exacerbating the problem are time zone changes and post-flight alcohol consumption, which can inhibit wakefulness. Normally, when you stop breathing while asleep, the brain automatically sends a wake-up call after about 10 seconds, and you wake up, gasping for air. Multiple time zone changes and alcohol consumption both inhibit arousal mechanisms and may result in oxygen deprivation of 30 seconds or longer before you heed the wake-up call. When you add up the oxygen starvation resulting from many occurrences per night, along with the subsequent arousals, the effect is significant fatigue.

Recognizing OSA

Typically, a person suffering from OSA is not aware of the condition. The only way it can be detected is through a *sleep study*. A complaint of loud and excessive snoring may be an important clue, since that is characteristically the first sign of OSA. Other symptoms suggesting OSA include:

- Difficulty in concentrating, thinking, or remembering.
- Daytime sleepiness, fatigue, and the need to take frequent naps.
- Headaches.
- Irritability.
- Short attention span.

Treating OSA

Once recognized and identified, OSA is highly treatable, either with surgery or non-surgical approaches. Obviously, non-surgical methods should be tried first -

- Behavioral changes

- Change sleeping position (sleep on side or stomach).
- Change sleeping environment (mattress, light level, temperature, etc.).
- Lower body fat (10% weight loss will decrease the OSA index by 25%).

- Dental appliances

- Dental appliances that thrust the lower jaw forward or otherwise open the airway are an excellent treatment for mild-to-moderate OSA and are about 75% effective.

- *Continuous positive airway pressure (CPAP) machine*

- Probably the best, non-surgical treatment for any level of OSA.
- Uses air pressure to hold the tissues open during sleep.
- Decreases sleepiness, as measured by surveys and objective tests.
- Improves cognitive functioning on tests.

- *Medications*

- Any medication taken for OSA must be approved by the FAA.
- Nasal steroid sprays are effective.
- Medications that have been studied include medroxyprogesterone, acetazolamide, and theophylline.

- *Surgical Methods*

These can be very significant (painful) surgeries that don't always succeed. They should be used only after non-surgical methods have failed.

- *Nasal airway surgery:* Corrects for swelling of the turbinates, septal deviation, and nasal polyps.
- *Palate implants:* Stiffen the palate to prevent it from collapsing
- *Uvulopalatopharyngoplasty:* Prevents collapse of the palate, tonsils, and pharynx.
- *Tongue reduction surgery:* Decreases the size of the base of the tongue.
- *Genioglossus advancement:* Pulls the tongue forward to enlarge the airway.

The Bottom Line

If you experience one or more symptoms of obstructive sleep apnea, it is recommended that you consult a physician, since OSA treatment scores a very high success rate. What about your medical certificate? If your OSA is treatable, you can maintain your airman medical certificate and continue to enjoy your aviation career. However, flying with untreated OSA constitutes an unnecessary risk and can become a safety-of-flight issue.

It's up to you! So...*sleep on it!*

Medical Facts for Pilots

Publication No. AM-400-10/1

Written by

J.R. Brown

Federal Aviation Administration

Civil Aerospace Medical Institute

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Physiological Training Classes for Pilots

If you are interested in taking a one-day aviation physiological training course with altitude chamber and vertigo demonstrations or a one-day survival course, learn about how to sign up for these courses that are offered at 13 locations across the U.S. by visiting this FAA Web site:

www.faa.gov/pilots/training/airman_education/aerospace_physiology/index.cfm

OK-10-2545

For AMEs Who Elect to Perform the OSA Assessment

Evaluating the risk of Obstructive Sleep Apnea (OSA) requires clinical judgment based on an **integrated assessment of history, symptoms, AND physical/clinical findings.** If an AME elects to perform the assessment for OSA, he/she must follow the American Academy of Sleep Medicine guidelines.

After completing the assessment, if the diagnosis of OSA is not made, the AME must sign and submit the OSA AME Assessment Statement. If the AME confirms the presence of OSA, then full clinical note with test results, if performed, must be submitted.

History of findings that suggest increased risk of OSA include:

- Hypertension requiring more than 2 medications for control or refractory hypertension
- Type 2 Diabetes
- Atrial fibrillation or nocturnal dysrhythmias
- Congestive heart failure
- Stroke
- Pulmonary hypertension
- Motor vehicle accidents, especially those associated with sleepiness/drowsiness
- Under consideration for bariatric surgery

Symptoms that suggest an increased risk of OSA include:

- Snoring
- Daytime sleepiness
- Witnessed apneas
- Complaints of awakening with sensation of gasping or choking
- Non-refreshing sleep
- Frequent awakening (sleep fragmentation) or difficulty staying asleep (maintenance insomnia)
- Morning headaches
- Decreased concentration
- Problems or difficulty with memory or memory loss
- Irritability

Physical/clinical findings that suggest increased risk of OSA include:

- High score on an OSA screening questionnaire (e.g., Berlin, Epworth)
- Increased neck circumference (>17 inches in men, >16 inches in women)
- A Modified Mallampati score of 3 or 4 (assessment of the oral cavity)
- Retrognathia
- Lateral peritonsilar narrowing
- Macroglossia
- Tonsillar hypertrophy
- Elongated/enlarged uvula
- High arched/narrow hard palate
- Nasal abnormalities such as polyps, deviation, and turbinate hypertrophy
- Obesity (AASM guidelines)

AME ASSESSMENT STATEMENT – OSA

AMEs who elect to perform an OSA assessment and find that the applicant does not meet the American Academy of Sleep Medicine (AASM) diagnostic criteria for OSA, must submit this statement to the FAA.

Airman/ Patient Name _____ DOB: _____

Reference Number (PI, MID, or App ID): _____

_____ (initial) I have performed an OSA assessment in accordance with AASM guidelines and have determined that there is no evidence of OSA requiring treatment at this time. (If a sleep study was performed it must be attached).

_____

_____

PHYSICIAN NAME _____

Address: _____

Office Telephone Number: _____

PHYSICIAN
SIGNATURE_____DATE_____

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