



AOBEM Part I Certification Examination Public Reporting 2011-2016

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Executive Summary

Passing the American Osteopathic Board of Emergency Medicine (AOBEM) Part I Certification Examination is a requirement in order for Doctors of osteopathic medicine (DOs) to receive certification from the AOBEM. The Board Certification Examination is developed by osteopathic practitioners (referred to as subject matter experts or SMEs) with extensive experience in the field of emergency medicine. SMEs work closely with test developers and psychometricians to develop an accurate and valid examination that reliably assesses candidates' proficiency. This report summarizes the AOBEM examination scores, pass rates and summary examination information from 2011 to 2016.

The National Board of Osteopathic Medical Examiners (NBOME) supports the development of, publication of, and psychometric services for the AOBEM Certification Examination.

Generating Scores

NBOME utilizes the Rasch model (often referred to as the 1- parameter logistic item response theory model) for scoring and equating. The Rasch model jointly estimates a difficulty parameter for each item and an ability score for each candidate. Candidate ability scores were transformed to have a mean of 600 and standard deviation of 100 for the base form of the examination. All subsequent examination cycles were scaled in reference to this group by implementing equating methods (namely the common item non-equivalent group design IRT pre-equating method; Kolen & Brennan, 2004). The minimum passing standard was applied to determine if the candidate met the predetermined cut-point to safely practice emergency medicine.

Candidate Performance and Pass Rates

The average passing rate for the Certification Examination from 2011 to 2016 was 88%. The highest percentage of candidates passing was in 2016 with 96% and the lowest was in 2012 with 83%. The passing rate has increased every year since 2012 (see Table 1 and Figure 1). This is mirrored by the mean standard score, which has also increased since 2012.

Table 1

Historic Pass Rates and Summary Statistics for the AOBEM Part I Certification Examination

Year of Examination	Number of Candidates	Mean Standard Score	Standard Deviation	Historic Pass Rate
2011	293	614	106	87%
2012	268	599	110	83%
2013	297	628	126	86%
2014	298	633	112	87%
2015	256	641	113	89%
2016	273	701	107	96%

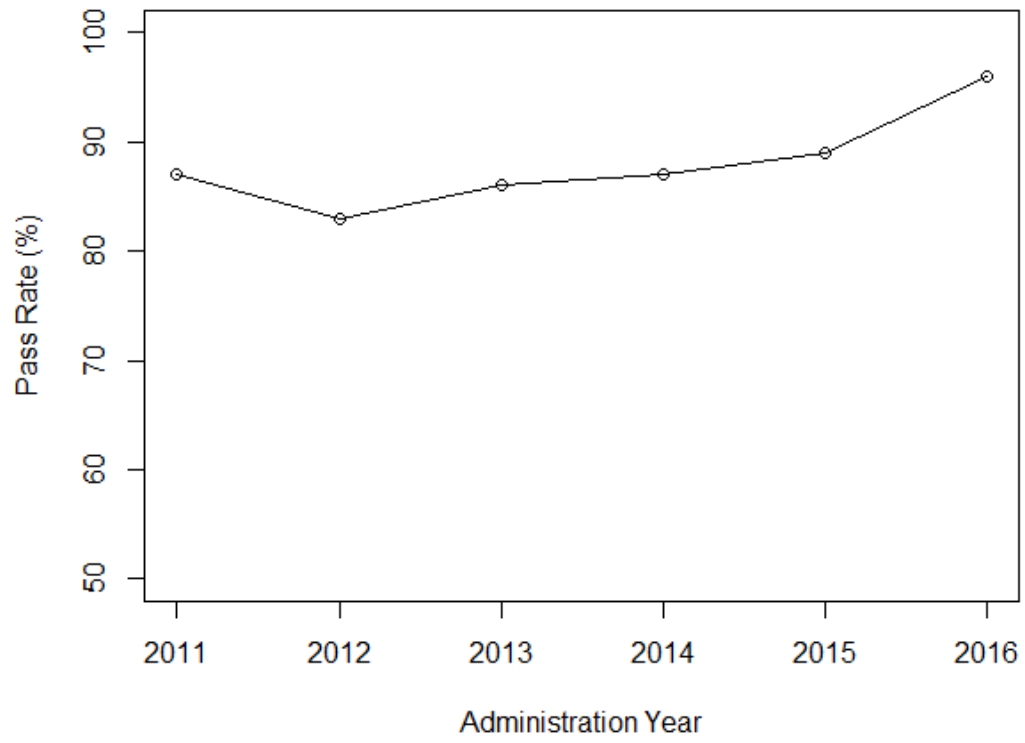


Figure 1. Historic pass rates from 2011 to 2016.

Content Representation

The AOBEM Part I Certification Examination is composed of items that currently represent 20 domains considered essential to assessing knowledge of emergency medicine. Table 2 displays the percentage of scored items on the examination by domain. A representative sample of items pertaining to critical domains in emergency medicine is important evidence for the content validity of the examination.

Table 2
Domain Representation By Year

Domain		2011	2012	2013	2014	2015	2016
		Representation on the Certification Examination (%)*					
ABD	Abdominal & Gastrointestinal Disorders	7.6	6.1	8.0	8.1	8.5	8.3
ADM	Administrative Aspects of Emergency Medicine	1.7	3.2	2.2	1.8	2.0	2.3
CAR	Cardiovascular Disorders	6.2	7.9	8.7	8.4	7.8	8.7
CLI	Clinical Pharmacology**	1.0	--	--	--	--	--
CUT	Cutaneous Disorders	3.1	2.9	2.9	2.5	2.0	2.3
DME	Emergency Medical Services/Disaster Medicine	3.5	1.8	2.6	2.1	2.4	1.9
END	Endocrine, Nutrition & Metabolism	3.1	4.3	3.6	3.9	3.7	3.8
ENV	Environmental Disorders	5.2	4.3	3.6	4.2	4.8	4.2
HEE	HEENT	4.5	7.9	5.5	4.2	4.4	3.8
HEM	Hematologic Disorders	1.7	5.4	4.4	1.8	2.0	2.7
IMM	Immune System Disorders**	2.4	--	--	--	--	--
MUS	Musculoskeletal Disorders	3.1	2.9	2.9	2.8	3.4	4.6
NER	Nervous System Disorders	8.7	2.5	6.2	9.8	8.2	9.1
OBD	Obstetrics & Disorders of Pregnancy	4.5	3.2	3.3	2.5	4.1	4.2
PED	Pediatric Disorders	6.6	8.3	9.1	9.8	8.8	8.8
PRO	Procedures/Skills	4.5	2.2	3.6	3.9	3.7	4.2
PSY	Psychobehavioral Disorders	3.1	2.2	3.6	3.2	2.4	2.3
REN	Renal Disorders	1.4	2.2	2.6	1.8	1.7	0.4
SID	Systemic Infectious Disorders	6.2	7.6	5.8	8.1	7.8	7.6
THO	Thoracic/Respiratory Disorders	7.6	7.9	8.0	8.8	8.8	8.0
TOX	Toxicologic Disorders	4.8	6.5	5.1	4.2	3.4	3.4
TRA	Trauma	8.3	10.1	8.7	8.4	9.9	9.9
URG	Urogenital/Gynecologic Disorders**	1.0	0.7	--	--	--	--

Note: * Percent of scored items on the examination after key validation.

** Domains were recoded to other domains in later examination cycles.

Subscore Performance

The AOBEM Part I Certification Examination assesses candidate's overall ability; therefore the score report does not include standard scores by domain. Instead, the score report shows a summary of performance by domain in order to provide information about each candidate's relative strengths and weaknesses. Table 3 displays the average percent correct from 2011 to 2016. Several domains (i.e., Clinical Pharmacology, Immune System Disorders, and Urogenital/Gynecologic Disorders) were recoded to other domains in later examination cycles. For example, Clinical Pharmacology was integrated into Toxicological Disorders in 2012. Immune System Disorders was integrated into Hematologic Disorders in 2012. Urogenital was integrated into Renal Disorders in 2013. Lastly, Gynecologic Disorders was integrated into Obstetrics and Disorders of Pregnancy in 2013.

Table 3

Average Percent Correct By Domain

Domain		2011	2012	2013	2014	2015	2016
		Average Percent Correct (%)					
ABD	Abdominal & Gastrointestinal Disorders	75	91	82	84	83	85
ADM	Administrative Aspects of Emergency Medicine	78	67	89	86	80	85
CAR	Cardiovascular Disorders	80	89	80	77	77	80
CLI	Clinical Pharmacology**	90	-	-	-	-	-
CUT	Cutaneous Disorders	80	94	84	81	80	82
DME	Emergency Medical Services/Disaster Medicine	75	60	74	85	77	76
END	Endocrine, Nutrition & Metabolism	70	88	79	75	84	89
ENV	Environmental Disorders	73	79	84	79	82	85
HEE	HEENT	78	82	78	81	80	75
HEM	Hematologic Disorders	52	77	77	84	73	83
IMM	Immune System Disorders**	77	-	-	-	-	-
MUS	Musculoskeletal Disorders	83	88	88	83	90	85
NER	Nervous System Disorders	84	100	85	82	79	83
OBD	Obstetrics & Disorders of Pregnancy	86	78	89	93	86	82
PED	Pediatric Disorders	81	76	78	81	80	82
PRO	Procedures/Skills	82	75	76	83	79	85
PSY	Psychobehavioral Disorders	90	92	94	90	94	83
REN	Renal Disorders	83	75	79	76	68	60
SID	Systemic Infectious Disorders	78	83	84	84	80	84
THO	Thoracic/Respiratory Disorders	69	86	78	78	81	81
TOX	Toxicologic Disorders	81	78	83	80	80	87
TRA	Trauma	79	82	79	79	76	84
URG	Urogenital/Gynecologic Disorders**	93	75	-	-	-	-

Note: ** Domains were recoded to other domains in later examination cycles.

Sample Items

The AOBEM Part I Certification Examination is a computer-based examination that utilizes multiple-choice questions to test the candidate's overall ability. Candidates can become familiar with the examination by reviewing the three sample questions provided.

Question 1

A 65-year-old male who is actively seizing is brought to the emergency department by ambulance. EMS administered 5 mg of intravenous diazepam (Valium®) en route. His finger-stick blood glucose level is 212 mg/dL. He is accompanied by his wife, who provides his history. Past medical history reveals noninsulin-dependent diabetes mellitus and one prior syncopal episode with a negative workup. He has never had a seizure. He has no known allergies. On examination he is actively seizing with tonic clonic activity of all extremities. Vital signs reveal:

Temperature	37.3°C (99.1°F)
Blood pressure	160/100 mmHg
Heart rate	115/min
Respiratory rate	15/min
Oxygen saturation	98% on 100% nonrebreather mask

A total of 7 mg of lorazepam (Ativan®) is administered without any resolution of the seizure activity. The most appropriate next step in this patient's medical management is administration of

- A. etomidate (Amidate®)
- B. pentobarbital (Nembutal®)
- C. phenobarbital (Solfoton®)
- * D. phenytoin (Dilantin®)
- E. propofol (Diprivan®)

*Indicates correct answer

Question 2

A female at 9 weeks' gestation presents with a 2-day history of crampy abdominal pain and vaginal bleeding with clots. She denies having passed any tissue. History reveals that she is Rh positive with an ultrasound-proven intrauterine pregnancy. Vital signs reveal:

Temperature	37°C (98.6°F)
Blood pressure	110/70 mmHg
Heart rate	94/min
Respiratory rate	18/min
Oxygen saturation	96% on room air

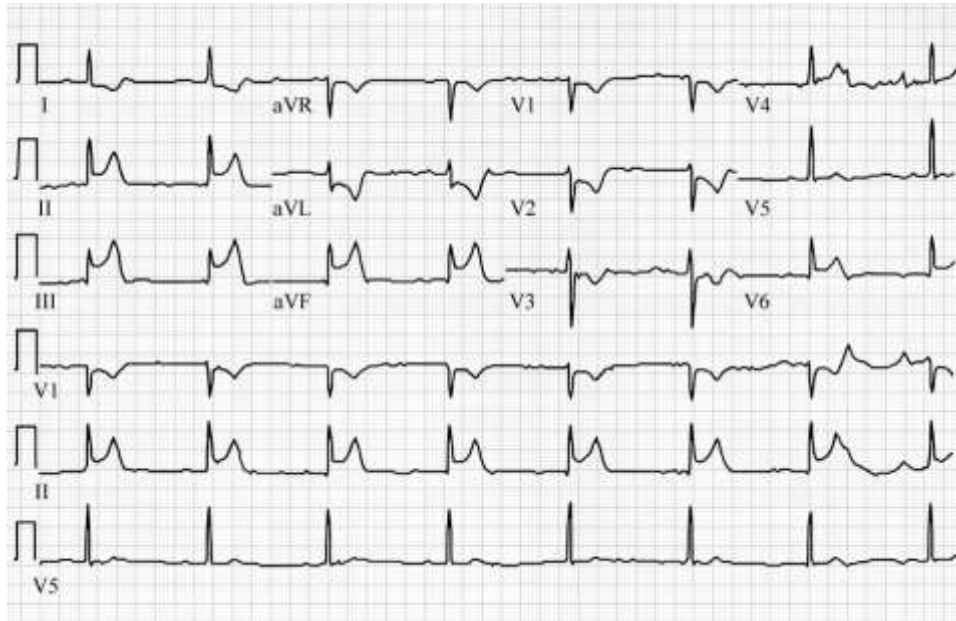
Examination of the abdomen reveals midline tenderness to deep palpation. On pelvic examination the uterus is enlarged with mild tenderness to palpation, and the cervical os is open. There is no adnexal tenderness and no fetal tissue is seen. The most likely diagnosis is

- A. complete abortion
- B. ectopic pregnancy
- C. incomplete abortion
- * D. inevitable abortion
- E. threatened abortion

*Indicates correct answer

Question 3

A 68-year-old male presents with a 4-hour history of chest pain. Vital signs reveal a blood pressure of 80/50 mmHg and a heart rate of 100/min. On physical examination neck veins are distended and lungs are clear to auscultation. ECG is obtained, as shown in the exhibit. The most likely diagnosis is



- A. left ventricular failure
- B. myocardial rupture
- C. pericardial effusion
- * D. right ventricular infarction
- E. rupture of the papillary muscle

*Indicates correct answer

Examination Reliability

Reliability is an important factor in any examination used for decision making. Reliability is an estimate of how well the test will produce the same results if administered repeatedly. Reliability coefficients based on Cronbach's alpha range from 0 to 1, where values closer to 1 indicate a higher degree of reliability. The Cronbach's alpha for AOBEM Part I Certification Examination from 2011 to 2016 ranged from 0.79 to 0.88 (Table 4). This range is considered acceptable for high-stakes examinations (Bland, & Altman, 1997; Nunnally & Bernstein, 1994).

Table 4

Examination Reliability

<u>Year of Examination</u>	<u>Reliability</u>
2011	0.88
2012	0.81
2013	0.87
2014	0.86
2015	0.85
2016	0.79

Supporting Research

The AOBEM Part I Certification Examination has demonstrated convergent validity and discriminant validity with other examinations that measure similar constructs. Convergent validity is the degree to which two examinations measure the same construct. Discriminant validity is the degree to which two examinations that measure different constructs do not overlap (e.g. mathematics and verbal ability). Additionally, researchers have found supporting evidence for the discriminant validity of the AOBEM Part I with other examinations containing diverging constructs. Two recent publications provide evidence for the validity of the AOBEM Part I Certification Examination.

A study conducted by Li, Gimpel, Arenson, Song, Bates and Ludwin (2014) investigated the convergent and predictive validity of the COMLEX-USA examination series (Level 1, Level 2-CE, and Level 3) in relation to the AOBEM Part I Certification Examination. Data for 451 candidates were used for this study. Researchers found a significant relationship between student performance on the AOBEM Part I Certification Examination and the COMLEX-USA Levels 2-3 ($r = 0.53$, $t(449) = 11.23$, $p < 0.001$ and 0.57 , $t(449) = 12.07$, $p < 0.001$ respectively) establishing a case for convergent validity. Correlation with the COMLEX-USA Level 1 was lower ($r = .47$, $t(449) = 9.96$, $p < 0.001$), providing evidence for divergent validity. Researchers highlight the differences in content between the AOBEM Certification Examination and COMLEX-USA Level 1s as a reason for the lower correlation value. Specifically, COMLEX-USA Level 1 is the first licensing examination that osteopathic medical students take, and the examination focuses on scientific understanding of health and disease (foundational biomedical sciences) whereas Level 3 focused more on applied clinical concepts (similar to the AOBEM Part I Certification Examination).

Another study by Levy, Dvorkin, Schwartz, Zimmerman, and Li (2014) supports the convergent validity of the AOBEM Part I Certification Examination by comparing

performance in terms of percentile scores on the Residency In-Service Examination (RISE) examination to standard scores and pass/fail decisions on the AOBEM Part I Certification Examination for 409 residents. Researchers found a strong correlation between scores on the RISE and scores on the AOBEM Part I ($r = 0.61$, $t(407) = 12.30$, $p < 0.001$). Students who scored higher on the RISE had a higher AOBEM Part I Certification Examination score and passed at a higher rate. Figure 2 displays the RISE score distribution for students who passed the AOBEM Certification Examination (Top) and the RISE score distribution for students who failed the AOBEM Part I Certification Examination.

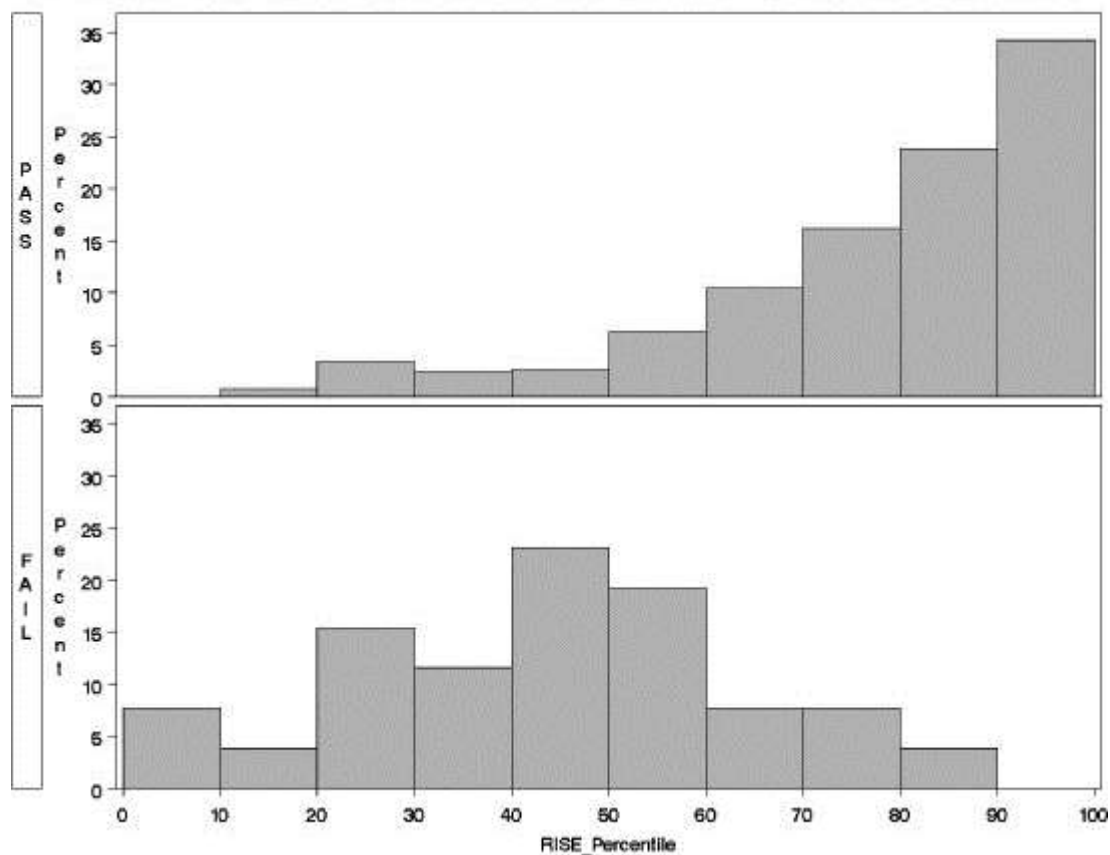


Figure 2. "The American Osteopathic Board of Emergency Medicine (AOBEM) Part I fail and pass rates for each decile score on the RISE (Levy, Dvorkin, Schwartz, Zimmerman, and Li, 2014)."

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