



End of Curriculum™ Exam

FACULTY GUIDE 2021 SUPPLEMENT

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Preface

Dear Members,

The PAEA End of Curriculum exam was first launched in January of 2020. This 300-question exam was developed over four years by a team of PA educators and national exam experts. As you may know, the PAEA End of Curriculum exam, delivered in the final four months of the PA program, is an objective, standardized evaluation of a PA student's medical knowledge as one component of their readiness for graduation. Since launch, 130 programs have used the PAEA End of Curriculum exam.

In Fall of 2021, PAEA conducted its second End of Curriculum Exam Standard Setting Study. This *End of Curriculum Exam Faculty Guide 2021 Supplement* will give you an update on why we conducted a second standard setting, the new categorical scores, and additional information on programmatic scoring.

PAEA Assessment prides ourselves in delivering quality, advancing learning, and facilitating success. We could not do it without our members. End of Curriculum is built by PA educators, for PA educators, and I want to thank everyone who participates as a volunteer on this exam. We hope you find this Supplement helpful and appreciate your continued interest in the PAEA End of Curriculum exam. Should you have additional questions, feel free to contact me directly at oziegler@PAEAonline.org.

Sincerely,



Olivia Ziegler
Chief Assessment Officer

Contributors

PAEA would like to acknowledge faculty from the following PA programs who participated in this standard setting panel and members of the PAEA Assessment staff who supported the standard setting panel.

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Hardin-Simmons University

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Mercer University

Mississippi College

Missouri State University

Northern Arizona University

Northwestern University

The University of Texas Southwestern Medical Center

Tufts University

University of Colorado

University of Iowa

University of Florida

University of Maryland

Valparaiso University

West Coast University

Introduction

The purpose of the PAEA End of Curriculum exam is to assess a PA student's general medical knowledge as one component of their readiness for graduation. The exam uses three policy levels to indicate the extent of a student's medical knowledge mastery: Limited Medical Knowledge, Satisfactory Medical Knowledge, and Advanced Medical Knowledge. The initial standard setting panel consisting of 21 subject matter experts in the field of PA education was convened in-person November 2019, to identify the scores on the 1200 to 1800 scale that adequately differentiated between students demonstrating each level of medical knowledge.

Consistent with best practices, standards are reviewed regularly to ensure the score scale and categorical scores adequately support the interpretation and use of the exam's scores. Changes to test content or changes in the test-taker population necessitate reconvening a standard setting panel, ensuring that either the current standards are appropriate or that the standards are updated to reflect the demands of the curriculum and the knowledgebase of the student population. The original standards set in 2019 made use of an initial sample of approximately 1,800 students at 44 programs. Following the launch and administration of the End of Curriculum exam in 2020 and 2021, with over 4,700 students from 130 programs sitting for the exam, it was found that students were performing higher than originally expected when the standards were set in 2019.

In maintaining PAEA's commitment to the quality of this new exam and in order to provide meaningful feedback to students and programs, a second standard setting was convened virtually between August 16 and September 9, with a total of 22 subject matter expert panelists participating and utilizing the larger, more robust sample of student data. The panelists worked collaboratively to define the knowledge, skills, and abilities (KSAs) corresponding to each policy level, the current categorical scores differentiating policy levels, and the distribution of the current student scores to recommend updated categorical scores. The panelists' recommended categorical scores were shared with, and approved by, the PAEA Board of Directors in September 2021, and will be used with the release of the next End of Curriculum exam forms in January of 2022.

PAEA End of Curriculum Exam Background

Students are only eligible to take the End of Curriculum exam within four months of graduation. While some features of the End of Curriculum exam are similar to features found on PAEA's End of Rotation™ and PACKRAT® exams, such as framing content and task distributions in terms of blueprint, other elements are unique. The content blueprint for the End of Curriculum exam includes 13 distinct content areas and seven task areas. The task areas can be further clustered into four entrustable professional activities (EPAs). The End of Curriculum exam also contains items (exam questions) that target three hierarchical Bloom's Taxonomy cognitive levels, covers three life course stages, and four patient care settings. PA educators and national exam experts developed the PAEA End of Curriculum exam items. Content development efforts are ongoing.

The exam is intended to gauge students' general medical knowledge, and hence, is of a length considerably longer than other examinations in the PAEA's suite of exams. The End of Curriculum exam contains 250 scored test items and 50 pretest items. The exam is administered in five sections, each containing 60 test items. The exam is administered in a secure, password-protected system that uses a lockdown browser to enhance test security.

PAEA End of Curriculum Standard-Setting Panelists

A valid standard-setting process must begin with careful selection of panelists. The panel must have expertise in the content tested by the exam and direct experience with the constituent population. Individuals on the panel must have the requisite knowledge and skills to judge test items and to determine a level of examination performance indicative of the degree of general medical knowledge possessed by a PA student preparing for graduation.

PAEA staff identified and recruited a diverse panel of 25 PA educators to participate in the 2021 Standard Setting study. Ultimately, a group of 22 PA educators met to review the current categorical scores and decide on what changes, if any should be made to the scores. When selecting participants, PAEA sought diversity in areas such as geographic region, gender, race, ethnicity, tenure in PA education, program affiliation, and professional role. Six participants were selected based on their contributions in the 2019 Standard Setting study. A further six were identified based on interest in exam development from other recruitment opportunities. The remainder were selected to meet the diversity targets listed above and to fill roles not satisfied through special appointments (e.g., geographic region, gender, etc.).

PAEA End of Curriculum Standard-Setting Procedures

Over the course of nearly five weeks, panelists participated in exercises to familiarize themselves with the exam content, define the KSA's of students performing at each policy level, then compare these sets of KSA's against the demands of individual items on the exam form. Training for the standard setting process included an overview of the PAEA End of Curriculum exam and standard setting, answering a selection of items from the PAEA End of Curriculum exam under the same proctored time constraints a student would experience, and discussion with their peer panelists to consider the student population who takes the exam.

Two standard setting methods were used by the panel to arrive at recommended categorical scores that would ultimately be presented to the PAEA Board of Directors. First, the panelists participated in an Item Mapping exercise. In Item Mapping, the panelists categorized each exam item into one of the three policy levels based on the knowledge demands of the item and the agreed upon KSA's corresponding to each policy level. The items that did not fit well into one of the three levels were assigned to a "gray area" between the levels. Second, a Bookmark Procedure was conducted on the items in each of the two gray areas to determine which scaled score most reasonably served as the categorical score to separate policy levels. In the Bookmark Procedure, panelists progressed through the set of items in ascending difficulty and placed their "bookmark" at the item that, in their judgment, was the tipping point between one policy level and the next. These bookmarks were aggregated across panelists, with the aggregated values serving as the recommended categorical scores to be shared with the PAEA Board of Directors.

Recommendations

The resulting categorical scores for differentiating between Limited, Satisfactory, and Advanced Medical Knowledge were shared with the PAEA Board of Directors in September of 2021. The Board approved the categorical scores as recommended, with the results shown below.

The scaled score necessary to achieve Satisfactory Medical Knowledge remained at 1400. The scaled score needed to achieve Advanced Medical Knowledge was set at 1555, an increase from the original score of 1525. An increase in the Advanced Medical Knowledge score was expected, as one impetus for convening this standard setting was a disproportionate number of students scoring in the Advanced category as compared to the base reference group of students who took the pilot exam in 2019. The scaled score national average, represented by the dashed line in the score report graphic and originally based on the reference sample of students who sat for the exam prior to 2020, was also updated to reflect the average of the larger, more robust sample of PA students who took the exam over the course of 2020 and 2021. The updated national average is 1519. This update allows for more accurate norm-referenced interpretations of student performance (i.e., a more accurate representation of a student's performance relative to that of their peers based on the most up-to-date data available).

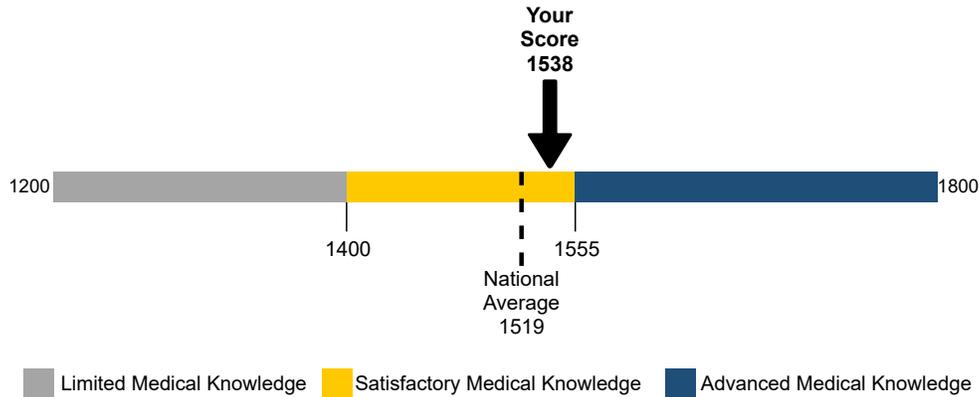
The score scale of 1200 to 1800 did not change. Scores from previous years can be compared against scores in future years, as a benefit of using scaled scores (as opposed to “raw scores,” such as number of questions correct or percent of questions correct) is their continuity and comparability over time and between exam forms. Again, what changed is the score necessary to achieve Advanced Medical Knowledge and the national average. Programs should expect to have more students scoring in Satisfactory Medical Knowledge and fewer in Advanced Medical Knowledge beginning in 2022, compared to 2020 and 2021.

The Student Report below shows the test taker how they performed on the exam compared to national averages. The top of the report demonstrates where the student's score falls on the scale and within the performance levels, relative to the national average. Sub-scores help the test taker identify target areas of strengths and weaknesses relative to national average performance. It is a PDF file that students and faculty can download and review together.

End of Curriculum Exam Performance Report

Sample Student

Exam Date: 12/02/2021



Feedback by Content Area and Task Area

Content Area	Content Blueprint	Your Performance	National Average
Cardiology	16%	1554	1529
Dermatology	4%	1525	1512
Endocrinology	6%	1555	1518
Gastrointestinal/Nutritional	10%	1522	1522
Head, ears, eyes, nose, oral cavity, and throat	8%	1568	1525
Hematology	4%	1563	1538
Infectious Diseases	4%	1509	1513
Neurology	6%	1540	1526
Obstetrics/Gynecology	8%	1480	1525
Orthopedics/Rheumatology	10%	1479	1518
Psychiatry/Behavioral Medicine	6%	1578	1525
Pulmonology	12%	1562	1525
Urology/Renal	6%	1493	1517
Task Area			
Clinical Intervention	12%	1504	1514
Clinical Therapeutics	18%	1583	1522
Diagnosis	22%	1506	1531
Diagnostic Studies	10%	1532	1527
Health Maintenance	10%	1487	1515
History and Physical	18%	1540	1525
Scientific Concepts	10%	1576	1527

Feedback by Entrustable Professional Activity

EPA	Content Blueprint	Your Performance	National Average
Develop and implement patient management plans	30%	1557	1518
Gather essential and accurate information about patients through history-taking, physical examination, and the use of laboratory data, imaging, and other methods	50%	1525	1527
Locate, critically evaluate, integrate, & appropriately apply scientific evidence to patient care	10%	1576	1527
Provide preventative health care services and education	10%	1487	1515

Feedback by Key Dimension Areas

Setting	Content Blueprint	Your Performance	National Average
Emergency Department	10%	1582	1528
Inpatient	20%	1509	1526
Outpatient	60%	1540	1522
Perioperative	10%	1519	1513

Life Course	Content Blueprint	Your Performance	National Average
Adult	60%	1535	1522
Geriatric (older patient with impaired overall function)	20%	1554	1525
Pediatric (birth to age 17)	20%	1525	1521

Bloom's Taxonomy	Content Blueprint	Your Performance	National Average
Analyze & Evaluate	40%	1530	1525
Remember	10%	1620	1518
Understand & Apply	50%	1516	1522

Student Score Report Disclaimer:

Your location in one of three performance categories is noted. The three performance categories are:

- Limited Medical Knowledge: The learner at the limited performance level demonstrates a partial understanding of general medical knowledge.
- Satisfactory Medical Knowledge: The learner at the satisfactory performance level demonstrates a sufficient understanding of general medical knowledge.
- Advanced Medical Knowledge: The learner at the advanced performance level demonstrates a comprehensive understanding of general medical knowledge.

The "National Average" is comparative data, based on average scores of a reference population of test takers in the relevant stage of their PA education. The National Average at the top of the score report and provided in the last column of the feedback sections are points of reference so you can compare your performance to your peers.

The listed percentages in the "Content Blueprint" column reflect the percentage of questions targeted for inclusion on each exam form; however, the actual content percentage on your test form may vary slightly from this target.

The number listed in the "Your Performance" column reflects your performance on the test questions in each area. Like the total score, your performance in each area ranges from 1200 to 1800.

Next Steps

The policy levels descriptors and scaled scores distinguishing between them serve as guideposts to programs in interpreting and using End of Curriculum exam scores. The purpose of the standard setting process is to provide interpretability to a score scale (e.g., add *meaning* to any individual score, such as 1500). The standards set here, in accordance with best practices in educational measurement, reflect the recommended score interpretations of a nationally representative panel of PA educators and subject matter experts who reviewed test content in light of their knowledge of PA students and curriculum. Individual programs are encouraged to use the policy levels and scaled scores in informing their own evaluation of a student's mastery of the curriculum, but should do so considering their own curricular demands and student population. The End of Curriculum exam is a powerful tool for assessing medical knowledge, with its scores rooted in the KSA's of students at different levels of performance. However, it is only one tool, and scores should be used in conjunction with other information in determining if a student has satisfied the requirements for graduation.

PAEA anticipates that the End of Curriculum exam standards will be reassessed in approximately three to five years; however, there are instances that may necessitate revisiting the standards sooner (e.g., changes to PA curriculum, the content of the exam, or the population of student test-takers). Given the impact of COVID-19 on PA program curricula and on the student experience in 2020 and 2021, student performance in subsequent years will be monitored and any significant differences in data will warrant another standard setting exercise.



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