PAEA

Physician Assistant Clinical Knowledge Rating and Assessment Tool

FACULTY GUIDE

Table of Contents

Preface

Dear Members,

This year—2020—marks a major milestone for the PAEA PACKRAT® exam. For 25 years, PACKRAT has helped students across the country assess their knowledge and has helped programs evaluate their curricula. Our work and experience creating PACKRAT has also been foundational in the development of the full suite of exams we offer today — PACKRAT, End of Rotation™, and End of Curriculum™.

As you may know, PACKRAT is an objective, comprehensive self-assessment tool for student and curricular evaluation typically offered at important transition times for PA students, most commonly at the end of the didactic and clinical phases of training.

It is important to note that there is no pre-set passing score for PACKRAT exams. The PACKRAT exam was developed as a student self-assessment and should be used as such. Programs are cautioned against interpreting the scoring and analytical reports outside of the statement of purpose. Specifically, PAEA explicitly discourages programs from using the PACKRAT exam for grading purposes or as a summative evaluation.

This guide offers faculty information on the PACKRAT exam, including how its blueprint, guiding principles, topic list, exam items, and core tasks and objectives were created, and the continuous scientific review that occurs with each version. Furthermore, it touches on the exam's overall construct validity.

We hope you find this guide helpful and appreciate your continued participation in PAEA. Should you have additional questions, feel free to contact me directly at oziegler@PAEAonline.org.

Sincerely,

Olivia Ziegler
Chief Assessment Officer

Contact Us

If you have any questions, please contact the Assessment Team at **301-617-7820** or exams@PAEAonline.org.

Exam Support is available **8:00 a.m. – 8:00 p.m. ET, Monday – Friday.**

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PACKRAT® Exam

STATEMENT OF PURPOSE

The Physician Assistant Clinical Knowledge Rating and Assessment Tool or PACKRAT is an objective, comprehensive self-assessment tool for student and curricular evaluation.

BACKGROUND

The PAEA PACKRAT exam is used by more than 95% of PA programs nationwide. Each exam consists of 225 new items, all used operationally. National performance data is released after 300 student administrations.

The exam is built using a two-dimensional content blueprint and topic list developed by experienced PA educators and national exam experts, specifically for PA students. All exam items are written and evaluated by PA educators as part of a rigorous multi-level peer review process.

PACKRAT can be delivered in a proctored or unproctored environment, on-site or remote, through a secure, password-protected website. Item order is randomized for each student, though each student sees all 225 items. The recommended completion time is one minute per question or 3.75 hours total; however, more time can be given to a candidate at the discretion of the program. The exam is a fixed-length linear test. All exam items are multiple choice questions with four or five answer options and each with only one correct answer.

Each educational institution is provided information about its students and the overall mean score and standard deviation of all examinees nationwide. It is then up to each institution to determine how it will use the scores. The exam items discriminate well between high- and low-performing students. The reliability of the exam is high.

Exam Development & Construction Methods

POOL ANALYSIS

Because each version of PACKRAT is comprised of completely new items, there is not a traditional item pool to analyze.

TEST CONSTRUCTION

The test is constructed using all of the items that have successfully completed peer-review. One form is built to blueprint specifications each year and is balanced for content (organ system) and task areas. In the event that there are not enough new items or there is a blueprint imbalance items from previous PACKRAT exams are used to complete construction.

CONTENT VALIDITY

Content validity refers to the extent to which an exam measures the knowledge it was designed to measure (Almanasreh, Moles, & Chen, 2019). PACKRAT's content validity is determined by the content experts who write and review items for the exam using their expertise as PA educators. From there, several review steps occur before an item makes it onto a live scored form, including small-group peer review and a full-committee peer review. Once an item has made it on to a form, it is reviewed again via a thorough form review process. Post-administration, items that do not perform well statistically are reviewed to ensure there is only one correct answer and no other content flaws are present.

BLUEPRINT

Content Areas
The PACKRAT blueprint (Appendix A) is two-dimensional, meaning that it is organized both by content and task areas. Each PACKRAT exam is built to blueprint and topic list specifications (Appendix B). Questions included on the exam are considered only a sample and may not reflect all content topics identified in the topic list. Questions developed for PACKRAT reflect the diverse group of patients whom PAs will be called upon to treat.

To learn more, visit: https://paeaonline.org/assessment/packrat/content/

Core Tasks And Objectives
Core Tasks and Objectives (Appendix C) are assessed by all of the PAEA examinations (PACKRAT, End of Rotation, and End of Curriculum) and should be provided to students to aid in their preparation for PACKRAT.

To learn more, visit: PAEAonline.org/assessment/core-tasks-and-objectives/

Guiding Principles

The PACKRAT exam was developed as a student self-assessment and should be used as such. It should not be used for a grade or as a summative exam, as that is not the intended purpose of the PACKRAT. The exam can also assist programs with their programmatic and curricular self-assessments as well.
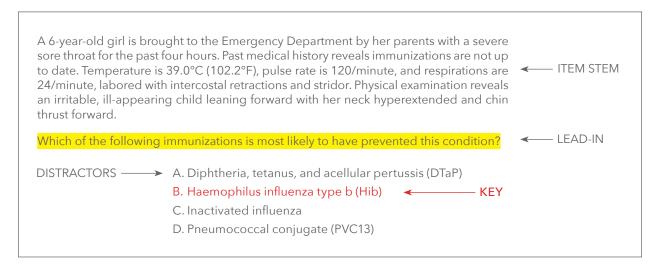
PACKRAT is intended to mark important transition times for PA students, most commonly at the end of the didactic and clinical phases of training. National comparative statistics for both year one and year two students are provided on score reports. Combined national comparative data for retired versions can be found on our website.

ITEM FORMAT

The PACKRAT exam uses a 'one best answer' format. Each item consists of a scenario or vignette (known as a stem), a question (known as a lead-in), and a list of potential solutions. The list of solutions consists of one correct or best answer (known as the key) and incorrect or inferior alternatives (known as distractors).

Each item on the PACKRAT exam includes a clinical vignette with a varying degree of complexity. Vignettes are a good measure for assessing higher-order thinking skills, and they provide a better approximation of real-life practice (National Board of Medical Examiners, 2016).

The following vignette is a sample item consistent with those on the PACKRAT exam:

A 6-year-old girl is brought to the Emergency Department by her parents with a severe sore throat for the past four hours. Past medical history reveals immunizations are not up to date. Temperature is 39.0°C (102.2°F), pulse rate is 120/minute, and respirations are 24/minute, labored with intercostal retractions and stridor. Physical examination reveals an irritable, ill-appearing child leaning forward with her neck hyperextended and chin thrust forward. ← ITEM STEM

Which of the following immunizations is most likely to have prevented this condition? ← LEAD-IN

DISTRACTORS → A. Diphtheria, tetanus, and acellular pertussis (DTaP)
B. Haemophilus influenza type b (Hib) ← KEY
C. Inactivated influenza
D. Pneumococcal conjugate (PVC13)

Note the structure of the stem and potential options. All of the items on our exams are coded to the blueprint and topic list; the coding for this specific item is as follows:

Content Area: ENT/Ophthalmology
Task Area: Health Maintenance
Diagnosis: Epiglottitis

ITEM ANALYSIS AND KEY VALIDATION

A PACKRAT exam does not have both operational and pre-test items. Rather, each item is operational and scoring is characterized as the number of questions answered correctly. PAEA performs ongoing analyses of operational PACKRAT items to ensure that they are meeting expectations, and to identify strong items that can be placed in our PACKRAT item pool. The item analysis is conducted using classical test theory principles in order to flag items for key validation.

PAEA uses three flagging criteria to identify items for review.

- p-value ≤ 0.35: Difficult items, those where 35% or fewer students answered correctly, are flagged for review.
- pbis ≤ 0.1 and p<0.9: Items with low discrimination that are not also easy are flagged for review. (Easy items, by their nature, do not discriminate well between low and high performers, as the clear majority of students answer the item correctly. Easy items are not flagged).
- key pbis < distractor pbis: Items with distractors that exhibit better discrimination than the key are flagged for review. These items have at least one incorrect answer option that appears plausible to high performers; sometimes these items are mis-keyed, or they may have more than one correct answer.

The point-biserial correlation coefficient (pbis), sometimes referred to as point biserial or discrimination, is used to measure the ability of an item to distinguish between high and low performers. A high pbis means that high performers are more likely to answer an item correctly than low performers. A negative pbis means that low performers are more likely to answer an item correctly than high performers. Too many low or negative point biserial items on an exam will reduce the overall reliability of the instrument. Note that PACKRAT items, because this is the first time they have been administered, are held to a higher standard than operational items on other exams that have seen more administrations and have passed through the flagging process at least once before.

Items flagged after the administration of each PACKRAT exam version are reviewed by a small group of PACKRAT item writers in a key validation meeting. Prepared materials for these meetings include a display of each item to be reviewed and a collection of relevant statistical information for each item. Subject matter experts review each flagged item and decide whether to keep the item as-is ("accept"), mark the item as "rewrite," or delete the item ("reject"). A psychometrician records the decision for each item and assists with the interpretation of statistical information. This process continues yearly after the exam is published.

PROJECT PLANNING AND QUALITY

Developing a high-quality, national standardized exam is a significant endeavor. Multiple individuals and processes are involved, and a well-documented system of exam development is necessary to ensure

quality. At PAEA, we utilize project management and quality assurance processes to ensure production goals are met and the quality of the PACKRAT exam is maintained through a systematic approach.

Scoring & Analytical Reports

STATEMENT OF PURPOSE

The PACKRAT exam is an objective, comprehensive self-assessment tool for student and curricular evaluation. It is important that programs have a clear understanding of the characteristics, meaning, intended interpretation, and limitations of the PACKRAT scoring and analytical reports.

Programs are cautioned against interpreting the scoring and analytical reports outside of the statement of purpose. Specifically, PAEA explicitly discourages programs from utilizing the PACKRAT exam as a summative evaluation.

SCORING AND INTERPRETATION

The PACKRAT exam is administered more than 18,000 times each year. National comparative data are available for each version of PACKRAT once 300 students have taken it, and those data are updated weekly as more students take the exam. Data are available for year one students, year two students, and all students who took each version.

PACKRAT is designed as a self-assessment tool for students. The exam may be given proctored or unproctored and/or as an open- or closed-book examination. However, if it is unproctored or open book, the PAEA honor code policies still apply to the exam administration. If the exam is delivered in a unproctored environment, programs can set a testing window; for example, allowing a student to start the exam at any time over a several-day period. Programs can also determine their own time limit for the exam up to six hours and 59 minutes plus time-and-a-half and double-time accommodations if appropriate. PAEA does not recommend or intend to recommend a passing grade or interpretation method for PACKRAT.

Each student test-taker's score is characterized as the number of items answered correctly. Under current practices, normative feedback comparing a test-taker's performance to other first-time test-takers is provided at the conclusion of the exam. First time test-takers are students who are taking a given version for the first time. First time does not mean the student's first time taking any PACKRAT form. This is done by creating a base reference group that consists of other first-time test-takers who completed the exam. The normative feedback provided is called the National Performance Average. This feedback provides a measure of the average performance by the population of student test-takers on the particular items taken.

Interpret with Caution

Data on small content and task areas (subscales), for example diagnostic studies in endocrinology, should be interpreted with caution because these subscales represent a small number of questions with varying levels of difficulty. However, the data have potential value if used to assess a content or task area on multiple exams. For example, pulmonology scores on PACKRAT, End of Rotation, End of Curriculum,

and PANCE can be compared. When programs triangulate the scores, if they appear to be lower than expected program faculty may want to review the curriculum on pulmonary diseases.

Make Data-Driven Decisions

Another valuable utilization of PACKRAT data is to analyze scores from cohort to cohort. With careful interpretation, programs can use PACKRAT data to set benchmarks at the individual student level, enabling programs to compare a student's score to the average of previous cohort scores. This can help individual students develop a study plan focused on their area(s) of weakness.

Reports can be used as program assessment tools, as well. At the program level, one can see if students' scores are steadily increasing or decreasing and use this information as one part of the curricular evaluation process. However, interpreting PACKRAT data over time is not the same as interpreting End of Rotation, End of Curriculum, or PANCE data, as those exams are standardized using scales. PACKRAT results should be compared over time relative to each version's national mean and standard deviation.

Trends

Detailed program reports are designed to help programs evaluate trends in knowledge, strengths, and deficits across entire classes of students and should be used with other data points to inform program-level curricular decision-making. If analyzed appropriately, PACKRAT data can be examined from cohort to cohort over time and, from an assessment standpoint, provide valuable information for program faculty and administration to reflect upon.

SAMPLE REPORTS

Student Performance Report

The Student Score Report allows students and programs to see how individual students compare to other PA students taking the same standardized exam nationwide. It is a PDF file that students and faculty can download and review together.

- **Scoring breakdown.** Students are provided a report that indicates their individual overall raw score (out of 225), a breakdown of individual performance (percent correct) by content and task area, national comparative data for each content and task area, and a "Your Percentile" score for each content and task area. The "Your Percentile" score is intended to provide the student with their relative rank overall versus the population of first-time test-takers.

- **Keyword feedback.** Keyword feedback provides information on the concept(s) missed. This can be used by the student to identify trends in knowledge deficits and serve as a tool to create a focused study plan. Students can use the content categories, task areas, and diagnosis keywords to develop individualized learning objectives to focus their studying.

Note: If there are multiple questions with the same diagnosis and task area coding, the keyword will only appear once. Thus, the number of keywords may not exactly match the number of missed questions.

PACKRAT Performance Report

Sample Student
Exam Date: 06/14/2018

Raw Score	174

Feedback by Content Area of the PACKRAT

Content Area	Content Blueprint	Your % Correct	National Performance Average	Your Percentile
SPECIALTIES				
Cardiology	16%	78%	63%	92%
Dermatology	5%	73%	51%	96%
Endocrinology	6%	79%	60%	91%
ENT/Ophthalmology	9%	80%	69%	78%
Gastrointestinal/Nutritional	10%	91%	62%	99%
Hematology	3%	57%	64%	37%
Infectious Diseases	3%	67%	62%	74%
Neurology	6%	69%	63%	66%
Obstetrics/Gynecology	8%	78%	67%	79%
Orthopedics/Rheumatology	10%	73%	63%	83%
Psychiatry/Behavioral Medicine	6%	60%	69%	24%
Pulmonology	12%	88%	68%	97%
Urology/Renal	6%	77%	59%	94%
TASKS				
Clinical Intervention	14%	79%	63%	94%
Clinical Therapeutics	18%	67%	52%	91%
Diagnosis	18%	84%	70%	92%
Diagnostic Studies	14%	89%	69%	98%
Health Maintenance	10%	68%	62%	69%
History and Physical	16%	82%	67%	88%

Scientific Concepts	10%	65%	62%	56%

Feedback by Keyword

Content Category Coding: Task Area, Diagnosis

The following list includes keyword feedback for the questions you answered incorrectly on the exam. If you missed multiple questions in one Content Category, the topic is only listed once. Therefore, you should not assume that the number of entries below directly corresponds to the number of questions you answered incorrectly.

· **Cardiology : Clinical Intervention, Constrictive pericarditis**

· **Cardiology : Clinical Intervention, Thrombophlebitis**

· **Cardiology : Clinical Therapeutics, Hypercholesterolemia**

· **Cardiology : Clinical Therapeutics, Other hyperkalemia**

· **Cardiology : Clinical Therapeutics, Prinzmetal angina**

· **Cardiology : Diagnostic Studies, Abdominal aortic aneurysm**

· **Cardiology : Health Maintenance, Ineffective endocarditis**

· **Cardiology : Scientific Concepts, Congestive heart failure**

· **Dermatology : Clinical Therapeutics, Rosacea**

· **Dermatology : Health Maintenance, Lice**

· **Dermatology : Scientific Concepts, Contact dermatitis**

· **Endocrinology : Clinical Therapeutics, Diabetes mellitus type 2**

· **Endocrinology : Diagnosis, Primary aldosteronism**

· **Endocrinology : Scientific Concepts, Diabetes insipidus**

· **ENT/Ophthalmology : Clinical Intervention, Serous otitis media**

· **ENT/Ophthalmology : Clinical Therapeutics, Herpes simplex**

· **ENT/Ophthalmology : Diagnostic Studies, Hyphema**

· **ENT/Ophthalmology : History and Physical, Retinal detachment**

· **Gastrointestinal/Nutritional : Health Maintenance, Alcoholic liver disease**

· **Gastrointestinal/Nutritional : Health Maintenance, Rotavirus**

· **Hematology : Diagnosis, Anemia of chronic disease**

· **Hematology : Diagnostic Studies, Iron deficiency anemia**

· **Hematology : Health Maintenance, Megaloblastic anemia**

· **Infectious Diseases : Clinical Therapeutics, Cellulitis**

· **Infectious Diseases : Diagnostic Studies, Tuberculosis**

· **Neurology : Clinical Intervention, Subdural hematoma**

· **Neurology : Diagnosis, Parkinson disease**

· **Neurology : Health Maintenance, Cerebrovascular accident**

· **Neurology : Scientific Concepts, Neurocysticercosis**

· **Obstetrics/Gynecology : Clinical Intervention, Pre-eclampsia**

· **Obstetrics/Gynecology : History and Physical, Preterm premature rupture of membranes**

· **Obstetrics/Gynecology : Scientific Concepts, Menopause**

· **Obstetrics/Gynecology : Scientific Concepts, Trichomonas vaginitis**

· **Orthopedics/Rheumatology : Clinical Intervention, Radial head fracture**

· **Orthopedics/Rheumatology : Clinical Therapeutics, Rheumatoid arthritis**

· **Orthopedics/Rheumatology : Diagnosis, Compartment syndrome**

· **Orthopedics/Rheumatology : Health Maintenance, Ankylosing spondylitis**

· **Orthopedics/Rheumatology : History and Physical, Anterior cruciate ligament tear**

· **Orthopedics/Rheumatology : History and Physical, Intertrochanteric fracture**

· **Psychiatry/Behavioral Medicine : Clinical Therapeutics, Bipolar I disorder**

· **Psychiatry/Behavioral Medicine : Clinical Therapeutics, Schizophrenia**

· **Psychiatry/Behavioral Medicine : Diagnosis, Panic disorder**

· **Psychiatry/Behavioral Medicine : Diagnosis, Schizoid personality disorder**

· **Psychiatry/Behavioral Medicine : History and Physical, Cannabis intoxication**

· **Psychiatry/Behavioral Medicine : Scientific Concepts, Neurocognitive disorder (dementia) due to Alzheimer disease**

· **Pulmonology : Clinical Therapeutics, Carbon monoxide poisoning**

· **Pulmonology : Clinical Therapeutics, Chronic bronchitis**

· **Pulmonology : History and Physical, Cheyne-Stokes Respirations**

· **Urology/Renal : Clinical Therapeutics, Chlamydial urethritis**

· **Urology/Renal : Clinical Therapeutics, Cystitis**

· **Urology/Renal : Diagnosis, Phimosis**

Student Score Report Disclaimer:

The "Content Blueprint" percentage indicated is based on the exam blueprint; however, the actual content percent may vary slightly by exam form based on the actual number of questions in that category. "Your % Items Correct" indicates the percent of questions you answered correctly in each content category. "Your Percentile" is intended to provide you with your relative rank overall versus the population of first time test-takers. For example, the 95th percentile would describe an examinee in the top 5% of test-takers in a given content area. The percentage in the "National Performance Average" column is based on the scores of students who have previously taken these questions, and is a point of reference so you can compare your performance to your peers'. This comparative data will display when at least 300 examinees have completed the examination and will be updated periodically as more students complete the exam. Examinees should take caution in interpreting the national performance average and percentiles for the smaller content areas of the blueprint, as these percentiles are based on a small number of test items.

Cohort Performance Report

The Cohort Performance Report shows program faculty how the cohort of test-takers compares to national averages. Overall and sub-score cohort averages are compared to the national average. The report also shows the cohort distribution among the performance levels compared to the reference population distribution. Overall scores are broken out by "All Examinations Year One", "First-Time Takers Year One", "All Examinations Year Two", and "First-Time Takers Year Two." Comparative data by content and task area are based on all other students taking the exam for the first time.

This report is provided in HTML format, updated as exams are completed, and able to be printed or saved as a PDF. The comparative data is updated as more students take the exam.

8/12/2020   Score Report

Sample PA University Performance Report by Class
PACKRAT Exam (PACKRAT024)

This report presents information on students and scores for the PACKRAT examination. Specific information about your program is confidential and is not released to any other program.

	Number of Exams	Mean Score	Standard Deviation	Number of Candidates
All PROGRAMS				
All Examinations Year One	6882	129.1	17.6	6882
First Time Takers Year One	6882	129.1	17.6	6882
All Examinations Year Two	7955	150.3	17.6	7955
First Time Takers Year Two	7955	150.3	17.6	7955
CLASS - Class of 2020				
All Examinations Year One	0	0.0	0.0	0
First Time Takers Year One	0	0.0	0.0	0
All Examinations Year Two	88	150.2	17.1	88
First Time Takers Year Two	88	150.2	17.1	88

PACKRAT Content Area Feedback

	CLASS - Class of 2020			All PROGRAMS		
	Year One	Year Two	All	Year One	Year Two	All
	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct
TASKS						
Clinical Intervention	0.00	67.58	67.58	57.23	65.57	61.70
Clinical Therapeutics	0.00	64.43	64.43	52.62	64.57	59.03
Diagnosis	0.00	76.70	76.70	68.66	76.86	73.06
Diagnostic Studies	0.00	61.54	61.54	51.50	60.87	56.52
Health Maintenance	0.00	67.51	67.51	58.50	66.91	63.01
History and Physical	0.00	66.67	66.67	58.41	68.68	63.92
Scientific Concepts	0.00	58.94	58.94	51.69	60.29	56.30
SPECIALTIES						
Cardiology	0.00	65.06	65.06	53.15	65.01	59.51
Dermatology	0.00	57.02	57.02	48.47	60.69	55.03
Endocrinology	0.00	73.54	73.54	66.41	74.50	70.74
ENT/Ophthalmology	0.00	80.11	80.11	67.15	76.69	72.26
Gastrointestinal/Nutritional	0.00	70.09	70.09	62.09	71.11	66.93
Hematology	0.00	75.49	75.49	64.01	77.09	71.03

1/2

8/12/2020   Score Report

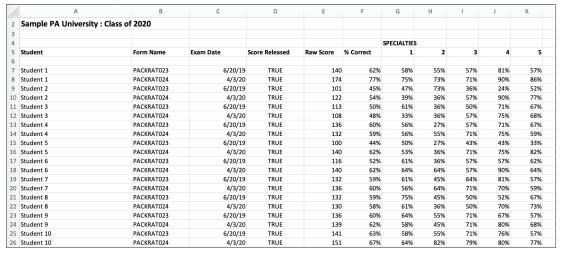|					
Infectious Diseases	0.00	51.89	51.89	44.61	55.91	50.67
Neurology	0.00	49.92	49.92	45.59	50.17	48.05
Obstetrics/Gynecology	0.00	62.12	62.12	53.51	61.32	57.70
Orthopedics/Rheumatology	0.00	72.11	72.11	64.70	70.77	67.96
Psychiatry/Behavioral Medicine	0.00	84.50	84.50	71.08	82.54	77.22
Pulmonology	0.00	51.53	51.53	41.99	53.80	48.32
Urology/Renal	0.00	79.55	79.55	72.58	77.57	75.26

Program Performance Report Disclaimer:

Comparative data under the "Content Area Feedback" section are based on all other students taking this exam for the first time. This comparative data will be updated periodically as more students take the exam.
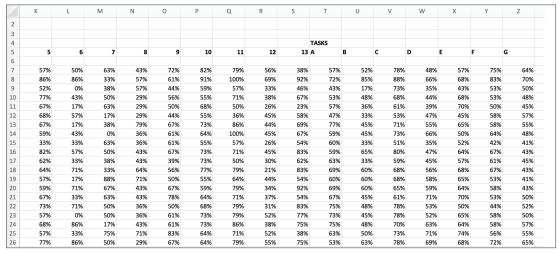
Composite Report

The Composite Report compiles individual student scores by form into a single report. It shows each student's overall and sub-score information, the date they took the exam, and whether the result has been released to the student. It is an Excel workbook that includes a Keys tab that indicates what each column stands for relative to the blueprint.
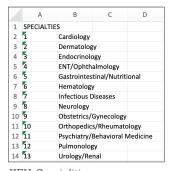
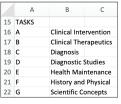**PACKRAT Composite Score Report Sample PA University: Class of 2020**

	A	B	C	D	E	F	G	H	I	J	K
2	Sample PA University : Class of 2020										
3											
4							SPECIALTIES				
5	Student	Form Name	Exam Date	Score Released	Raw Score	% Correct	1	2	3	4	5
6											
7	Student 1	PACKRAT023	6/20/19	TRUE	140	62%	58%	55%	57%	81%	57%
8	Student 1	PACKRAT024	4/3/20	TRUE	174	77%	75%	73%	71%	90%	86%
9	Student 2	PACKRAT023	6/20/19	TRUE	101	45%	47%	73%	36%	24%	52%
10	Student 2	PACKRAT024	4/3/20	TRUE	122	54%	39%	36%	57%	90%	77%
11	Student 3	PACKRAT023	6/20/19	TRUE	113	50%	61%	36%	50%	71%	67%
12	Student 3	PACKRAT024	4/3/20	TRUE	108	48%	33%	36%	57%	75%	68%
13	Student 4	PACKRAT023	6/20/19	TRUE	136	60%	56%	27%	57%	71%	67%
14	Student 4	PACKRAT024	4/3/20	TRUE	132	59%	56%	55%	71%	75%	59%
15	Student 5	PACKRAT023	6/20/19	TRUE	100	44%	50%	27%	43%	43%	33%
16	Student 5	PACKRAT024	4/3/20	TRUE	140	62%	53%	36%	71%	75%	82%
17	Student 6	PACKRAT023	6/20/19	TRUE	116	52%	61%	36%	57%	57%	62%
18	Student 6	PACKRAT024	4/3/20	TRUE	140	62%	64%	64%	57%	90%	64%
19	Student 7	PACKRAT023	6/20/19	TRUE	132	59%	61%	45%	64%	81%	57%
20	Student 7	PACKRAT024	4/3/20	TRUE	136	60%	56%	64%	71%	70%	59%
21	Student 8	PACKRAT023	6/20/19	TRUE	132	59%	75%	45%	50%	52%	67%
22	Student 8	PACKRAT024	4/3/20	TRUE	130	58%	61%	36%	50%	70%	73%
23	Student 9	PACKRAT023	6/20/19	TRUE	136	60%	64%	55%	71%	67%	57%
24	Student 9	PACKRAT024	4/3/20	TRUE	139	62%	58%	45%	71%	80%	68%
25	Student 10	PACKRAT023	6/20/19	TRUE	141	63%	58%	55%	71%	76%	57%
26	Student 10	PACKRAT024	4/3/20	TRUE	151	67%	64%	82%	79%	80%	77%

Left side

	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
2																
3																
4										TASKS						
5	5	6	7	8	9	10	11	12	13	A	B	C	D	E	F	G
6																
7	57%	50%	63%	43%	72%	82%	79%	56%	38%	57%	52%	78%	48%	57%	75%	64%
8	86%	86%	33%	57%	61%	91%	100%	69%	92%	72%	85%	88%	66%	68%	83%	70%
9	52%	0%	38%	57%	44%	59%	57%	33%	46%	43%	17%	73%	35%	43%	53%	50%
10	77%	43%	50%	29%	56%	55%	71%	38%	67%	53%	48%	68%	44%	68%	53%	48%
11	67%	17%	63%	29%	50%	68%	50%	26%	23%	57%	36%	61%	39%	70%	50%	45%
12	68%	57%	17%	29%	44%	55%	36%	45%	58%	47%	33%	53%	47%	45%	58%	57%
13	67%	17%	38%	79%	67%	73%	86%	44%	69%	77%	45%	71%	55%	65%	58%	55%
14	59%	43%	0%	36%	61%	64%	100%	45%	67%	59%	45%	73%	66%	50%	64%	48%
15	33%	33%	63%	36%	61%	55%	57%	26%	54%	60%	33%	51%	35%	52%	42%	41%
16	82%	57%	50%	43%	67%	73%	71%	45%	83%	59%	65%	80%	47%	64%	67%	43%
17	62%	33%	38%	43%	39%	73%	50%	30%	62%	63%	33%	59%	45%	57%	61%	45%
18	64%	71%	33%	64%	56%	77%	79%	21%	83%	69%	60%	68%	56%	68%	67%	43%
19	57%	17%	88%	71%	50%	55%	64%	44%	54%	60%	60%	68%	58%	65%	53%	41%
20	59%	71%	67%	43%	67%	59%	79%	34%	92%	69%	60%	65%	59%	64%	58%	43%
21	67%	33%	63%	43%	78%	64%	71%	37%	54%	67%	45%	61%	71%	70%	53%	50%
22	73%	71%	50%	36%	50%	68%	79%	31%	83%	75%	48%	78%	53%	50%	44%	52%
23	57%	0%	50%	36%	61%	73%	79%	52%	77%	73%	45%	78%	52%	65%	58%	50%
24	68%	86%	17%	43%	61%	73%	86%	38%	75%	75%	48%	70%	63%	64%	58%	57%
25	57%	33%	75%	71%	83%	64%	71%	52%	38%	63%	50%	73%	71%	74%	56%	55%
26	77%	86%	50%	29%	67%	64%	79%	55%	75%	53%	63%	78%	69%	68%	72%	65%

Right side

	A	B	C	D
1	SPECIALTIES			
2	1	Cardiology		
3	2	Dermatology		
4	3	Endocrinology		
5	4	ENT/Ophthalmology		
6	5	Gastrointestinal/Nutritional		
7	6	Hematology		
8	7	Infectious Diseases		
9	8	Neurology		
10	9	Obstetrics/Gynecology		
11	10	Orthopedics/Rheumatology		
12	11	Psychiatry/Behavioral Medicine		
13	12	Pulmonology		
14	13	Urology/Renal		

KEY_Specialities

	A	B	C
15	TASKS		
16	A	Clinical Intervention	
17	B	Clinical Therapeutics	
18	C	Diagnosis	
19	D	Diagnostic Studies	
20	E	Health Maintenance	
21	F	History and Physical	
22	G	Scientific Concepts	

KEY_Tasks

IMPORTANT CONSIDERATIONS

A range of circumstantial factors may influence student performance on PACKRAT exams, leading to differences in performance within or among programs. Some of these factors apply to any examination, while others may apply more specifically to PACKRAT and comparisons to national data. Consider:

- **Student motivation.** PACKRAT is a self-assessment exam that is not to be used for grading purposes. If an exam has no weight relative to a student's overall grade, it could impact a student's efforts and exam performance.

- **Timing of the administration.** PACKRAT may be administered multiple times and at any time. It is intended to mark important transition times for PA students, most commonly the end of the didactic and clinical phase of training. PACKRAT scores reflect the number correct out of 225 questions and the percent of questions answered correctly compared to *first-time* PACKRAT takers, year one, and *first-time* PACKRAT takers, year two.

- **Testing administration.** PACKRAT may be given proctored or unproctored, closed-book or open-book. With more than 18,000 administrations a year, these differences do not impact the national data by the end of the year, but should be considered when reviewing student or cohort performance, particularly in the first few months of administration when administration numbers are still low.

- **Comparative data are version-specific.** National comparative data are reported by specific PACKRAT version. Although the exam is built each year to the same blueprint specifications and targets using the same process year over year, each version may be slightly harder or easier for a variety of reasons. For example, a 130/225 on one version and a 130/225 on the next version mean something slightly different.

Research on the PACKRAT Examination

Since the inception of the PACKRAT exam, researchers have been conducting multiple studies looking at various correlations that include but are not limited to: PANCE performance, overall program performance, admissions, and End of Rotation performance. Below is a list of publications related to PACKRAT research. It is worth highlighting that whether PACKRAT is given with or without a proctor the scores remain similar among students. Additionally, length of time to complete the PACKRAT exam has no impact on examinee performance.

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12. Cody JT, Adamson KA, Parker RL, Brakhage CH. (2004). Evaluation of the relationship between student performance on the PACKRAT and PANCE examinations. *Journal of Physician Assistant Education*, 15(1):42-46.

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1. Almanasreh E, Moles R, Chen TF. (2019). Evaluation of methods used for estimating content validity. *Research in Social and Administrative Pharmacy*, 15(2):214-21.

2. National Board of Medical Examiners. (2016). Constructing Written Test Questions for the Basic and Clinical Sciences, 4th ed. https://www.nbme.org/publications/item-writing-manual.html

Glossary of Terms

Assessment – The systematic collection of valid, reliable, and unbiased (to the extent possible) data about formal and informal educational activities, programs, and courses undertaken for the purpose of identifying what learners know, understand, and can do as a result of educational experiences

Assessment Tools/Instruments – Techniques and/or instruments used to collect assessment data

Benchmark – A standard point of reference used for comparison/assessment

Blueprint – A structured examination outline with associated area weights usually formatted as an outline or matrix

Clinical Vignette – Patient-related cases and scenarios that are often used to describe a problem in a multiple choice exam

Construct/Content Validity – Degree to which a measurement instrument accurately represents the knowledge, skill, or characteristic it is designed to measure

Content Area – Organ systems such as Cardiology or Endocrinology

Curriculum – A set of interrelated and integrated activities that facilitate student learning in a developmentally appropriate manner, designed to foster satisfactory achievement of student learning outcomes

Data – The raw observations or measurements from which information is derived to be used as a basis to form reasoning

Distractor – Incorrect or inferior alternatives on a multiple choice test item

Feedback – Information provided to the learner, instructor, and/or program director to guide future action

Form – A particular set of items that conform to the specifications of a blueprint

Information – Data in context

Items – A general term referring to questions that appear in assessment instruments to which candidates must respond

Item Discrimination – Used to determine how well an item is able to discriminate between high- and low-performing students

Item Pool – The system by which test items are stored and classified to facilitate item development, item review, and exam construction.

Key – Correct answer on a multiple-choice exam item

Key Validation – A statistical analysis of item performance conducted after an exam to help verify that the answer key was correct and that individual test items are free of flaws

Lead-in – The part of the stem in a multiple-choice item that tells the student exactly what needs to be answered. For example, "what is the most likely diagnosis?"

Mean – Arithmetic average obtained by adding all scores and dividing by the total number of scores

Norm Referenced Testing – Testing in which test items are selected by examining the test performance of a reference (norm) group against which a student's individual performance will be compared

P-value – Percentage of examinees choosing the correct answer

Point-Biserial Correlation Coefficient (pbis) – Used to measure the ability of an item to distinguish between high and low performers

Psychometrics – The science and technology of mental measurement, including psychology, behavioral science, education, statistics, and information technology

Psychometricians – An expert and/or practitioner in psychometrics

Raw Score – The number of items correct out of the total number of items taken, the raw score is a data point that has not been transformed

Reliability – The degree to which scores on an assessment instrument are free of measurement error

Reporting – The process by which assessment information is communicated to constituents for use in evaluation

Standard Deviation – A measure of the variability or dispersion of a distribution of scores. The more the scores cluster around the mean, the smaller the standard deviation; the greater the dispersion, the greater the standard deviation

Stem – The scenario or problem section in a multiple-choice item

Subject Matter Expert – A person with documented expertise in a profession, occupation, or role whose input into the development and validation of assessment instruments helps to ensure validity

Summative Evaluation – Evaluation of assessment data at the end of an educational experience in order to provide feedback on the attainment of learning goals and objectives

Task Area – Knowledge and skill areas on the End of Curriculum exam; for example: Diagnosis and Clinical Intervention

Validity – The degree to which accumulated evidence supports specific interpretations of all components of a certification program

PACKRAT Exam Blueprint

PACKRAT® Exam Blueprint

PACKRAT 225-Question Exam		History & Physical	Diagnostic Studies	Diagnosis	Health Maintenance	Clinical Intervention	Clinical Therapeutics	Scientific Concepts	Totals
		(16%)	(14%)	(18%)	(10%)	(14%)	(18%)	(10%)	(100%)
Cardiology	(16%)	6	5	7	4	4	6	4	36
Pulmonology	(12%)	4	4	4	3	4	5	3	27
Gastrointestinal/nutritional	(10%)	4	3	4	2	3	4	2	22
Orthopedics/rheumatology	(10%)	4	3	4	2	3	4	2	22
ENT/ophthalmology	(9%)	3	2	4	2	3	4	2	20
Obstetrics/gynecology	(8%)	3	3	3	2	2	3	2	18
Endocrinology	(6%)	2	2	3	1	2	2	1	13
Neurology	(6%)	2	2	3	1	2	3	1	14
Psychiatry/behavioral medicine	(6%)	2	2	3	1	2	3	1	14
Urology/renal	(6%)	2	2	2	1	2	4	1	14
Dermatology	(5%)	2	2	2	1	2	1	1	11
Hematology	(3%)	1	1	1	1	1	1	1	7
Infectious diseases	(3%)	1	1	1	1	1	1	1	7
Totals:	(100%)	36	32	41	22	31	41	22	**225**

PACKRAT Topic List

PACKRAT®
TOPIC LIST

CARDIOLOGY

Arrhythmias/conduction disorders

Bacterial infections

Cardiomyopathy

    Pericarditis

Congenital heart disease

Congestive heart failure

Hypertension

    Essential

    Malignant

    Secondary

Ill-defined presentations

    Chest pain

    Edema

Infectious heart disease

    Endocarditis/viral myocarditis

    Rheumatic fever/myocardial tissue- and valve-related

Ischemic heart disease

    Angina pectoris

    Myocardial infarction

    Other ischemic heart disease

Symptoms referable to the cardiovascular system

    Dyspnea

    Murmurs

    Palpitations

Vascular disease

    Aortic aneurysm

    Arterial embolism

    Atherosclerosis

    Peripheral vascular disease

    Phlebitis/thrombophlebitis

    Varicose veins

    Venous embolism/thrombosis

PULMONOLOGY

Bacterial infections

Chronic obstructive pulmonary disease
  Chronic airway obstruction
  Chronic bronchitis
  Obstructive chronic bronchitis
  Other emphysema

Ill-defined presentations
  Allergy

Lower respiratory infections
  Acute bronchiolitis
  Acute bronchitis
  Croup
  Influenza
  Pneumonias
  Pulmonary tuberculosis

Lung disease due to external agents
  Pneumoconioses due to
  silica/asbestos

Neoplasms

Symptoms referable to the pulmonary system
  Cough
  Dyspnea
  Stridor

Viral infections

Wounds/injuries of the pulmonary system
  Foreign body in trachea
  Internal injury of chest
  Traumatic pneumothorax

Other diseases of the respiratory system
  Asthma
  Non-sexually transmitted diseases chlamydial
  Pleural (effusion, no effusion)
  Pneumothorax
  Pulmonary embolism and infarction
  Respiratory distress syndrome
  Sarcoidosis

GASTROINTESTINAL/NUTRITIONAL

Bacterial infections

Disorders of the esophagus
- Esophagitis
- Gastroesophageal reflux disease
- Neoplasms
- Other diseases of the esophagus

Disorders of the gallbladder
- Cholecystitis
- Cholelithiasis

Disorders of the liver
- Cirrhosis
- Hepatitis
- Hepatoma
- Other diseases of the liver

Disorders of the pancreas
- Diseases of the pancreas
- Neoplasms

Disorders of the rectum
- Abscess of anal and rectal regions
- Anal fissure
- Hemorrhoids
- Neoplasms
- Pilonidal cyst without abscess
- Other diseases of the rectum

Disorders of the small intestine/colon
- Appendicitis
- Constipation
- Diverticulitis
- Enteric infection
- Inflammatory bowel disease
- Intestinal obstruction
- Irritable bowel syndrome
- Ischemic bowel disease
- Neoplasms
- Peritonitis
- Other diseases of intestines
- Other noninfectious gastroenteritis

Disorders of the stomach
- Disorders of the stomach
- Duodenal ulcer
- Gastric ulcer
- Gastritis/duodenitis
- Neoplasms

Feeding or eating disorders
- Anorexia nervosa
- Bulimia
- Obesity

Ill-defined presentations
- Abdominal mass
- Abdominal pain
- Reye syndrome

Manifestations of the digestive system
- Ascites
- Dyspepsia
- Dysphagia
- Gastrointestinal hemorrhage
- Hepatomegaly

Nutritional deficiencies
- Avitaminosis

Symptoms referable to nutritional disorders
- Weight fluctuation

Toxic effects of other substances
- Adverse effects of medicines
- Drug overdose

Viral infections

Wounds/injuries
- Swallowed foreign body
- Internal injury of the abdomen

Other diseases of the digestive system
- Congenital anomalies
- Hernias
- Neoplasms

ORTHOPEDICS/RHEUMATOLOGY

Bacterial infections

Contusions
- Various contusions (head, trunk, limbs)

Disorders of back/spine
- Back sprain
- Contusion of back
- Kyphoscoliosis/scoliosis
- Spinal stenosis
- Spondylosis

Fractures/dislocations
- Closed fracture of hand phalanges
- Dislocations/separations
- Fracture of neck femur
- Fracture of vertebral column
- Various fractures (foot, leg, arm)

Minor/acute musculoskeletal problems
- Acute and chronic osteomyelitis
- Arthralgia
- Bursitis
- Developmental problems
- Effusion of joint
- Ganglion/cyst of synovium/ tendon/bursa
- Myalgia/myositis
- Pain in limb
- Synovitis/tenosynovitis
- Other diseases of muscles/ ligaments/fascia
- Other disorders of bone and cartilage

Osteoarthrosis and arthropathies

Osteoporosis
- Pathologic fracture

Rheumatoid condition
- Rheumatoid arthritis
- Various collagen disorders
- Other nonarthritic rheumatism

Other diseases/disorders of the musculoskeletal system
- Carpal tunnel syndrome
- Lyme disease
- Rotator cuff syndrome
- Temporomandibular joint disorders
- Various sprains/strains

ENT/OPHTHALMOLOGY

Bacterial infections

Disorders of the ear
- Hearing impairment
- Impacted cerumen
- Otitis externa
- Otitis media
- Vertigo
- Other diseases of the ear/mastoid

Disorders of the eye
- Blunt and penetrating trauma
- Blurred vision
- Cataract
- Conjunctivitis
- Decreased visual acuity
- Diabetic retinopathy
- Diseases of globe
- Disorders of the optic nerve/visual path
- Glaucoma
- Hypertensive retinopathy
- Retinal detachment/puncture
- Strabismus

Disorders of the nose/oral cavity/sinuses/throat
- Acute sinusitis
- Allergic rhinitis
- Chronic sinusitis
- Epiglottitis
- Epistaxis
- Upper respiratory infection

Herpes simplex

Neoplasms

Viral infections

Wounds/injuries of ear/nose/oral cavity/throat
- Epistaxis
- Foreign body in ear/nose/oral cavity/throat

Wounds/injuries of the eye
- Cranial or ocular injuries
- Eye burn
- Foreign body in eye

OBSTETRICS/GYNECOLOGY

Bacterial infections
- Sexually transmitted diseases

Complicated pregnancy
- Abruptio placenta
- Adolescent pregnancy
- Central nervous system malformation in fetus
- Eclampsia
- Ectopic pregnancy
- Incompetent cervix
- Induced abortion
- Infection of genitourinary tract
- Multiple fetuses
- Placenta previa
- Preeclampsia
- Rh incompatibility
- Septic abortion
- Spontaneous abortion
- Trisomy
- Unspecified antepartum hemorrhage
- Other infections complicating pregnancy

Diseases/disorders of the male/female reproductive system
- Disorders of the pelvic organs
- Infertility
- Pelvic inflammatory disease

Disorders of the breast
- Inflammatory diseases
- Neoplasms
- Other breast-related problems

Disorders of the cervix
- Abnormal Papanicolaou smear
- Cervicitis
- Dysplasia of cervix
- Endocervicitis
- Neoplasms

Disorders of the ovary
- Neoplasms
- Ovarian cysts

Disorders of the uterus
- Leiomyoma of uterus
- Neoplasms
- Other disorders of the uterus

Menopause

Menstrual
- Dysmenorrhea
- Premenstrual syndrome
- Other disorders of menstruation

Uncomplicated pregnancy
- Normal labor and delivery
- Routine prenatal care

Vagina/vulva
- Candidiasis of vulva/vagina
- Neoplasms
- Prolapse of vaginal walls
- Vaginitis
- Vulvovaginitis

Viral infections

ENDOCRINOLOGY

Diabetes mellitus
　　Complications of diabetes
　　Hypoglycemia
　　Specified manifestation
Diseases of the thyroid gland
　　Hyperthyroidism
　　Hypothyroidism
　　Neoplasms
　　Parathyroid disease

Disorders of the adrenal gland
Other endocrine diseases
　　Electrolyte disorders
　　Gout
　　Hyperlipidemia

NEUROLOGY

Bacterial infections
Central nervous system trauma
Degenerative
　　Alzheimer disease
　　Multiple sclerosis
　　Parkinson disease
Diseases of peripheral nerves
　　Neuralgia/neuritis
　　Neuropathies
Diseases of the central nervous system
　　Rabies
Epilepsy
Ill-defined presentations
　　Dizziness
　　Giddiness
　　Headache
　　Malaise and fatigue
　　Neurodevelopmental disorders
　　Sleep disturbances
　　Syncope

Infectious diseases
　　Brain abscess
　　Meningitis
Migraine
Neoplasms
Neurodevelopmental disorders
Reye syndrome
Vascular diseases
　　Cerebral vascular accident
　　Seizure
　　Transient cerebral ischemic attack
Viral infections

PSYCHIATRY/BEHAVIORAL MEDICINE

Anxiety disorders
- Generalized anxiety disorder
- Panic disorder
- Phobic disorders
- Posttraumatic stress disorder

Conditions referable to behavioral medicine
- Child/elder neglect/violence
- Rape/crisis adjustment
- Spouse or partner neglect/violence
- Sudden infant death syndrome family
- Uncomplicated bereavement

Depressive disorders/bipolar and related disorders

Disruptive, impulse-control and conduct disorders/ neurodevelopmental disorders

Feeding or eating disorders
- Anorexia nervosa
- Bulimia nervosa
- Obesity

Ill-defined presentations
- Altered mental status
- Confusion states

Personality disorders

Schizophrenia spectrum and other psychotic disorders
- Delusional disorder
- Schizoaffective disorder
- Schizophrenia
- Schizophreniform disorder

Somatic symptom and related disorders

Substance-related disorders
- Alcohol-related disorders
- Caffeine-/tobacco-related disorders
- Drug-related disorders

UROLOGY/RENAL

Bacterial infections

Infectious diseases of the kidney/urinary tract
- Acute cystitis
- Gonococcal urethritis
- Pyelonephritis
- Pyuria
- Urethritis
- Urinary tract infections

Manifestations of the genitourinary system
- Dysuria
- Renal colic

Obstructive urinary tract diseases
- Nephrolithiasis
- Ureteral calculus

Prostatic hyperplasia

Renal diseases
- Acute renal failure/insufficiency
- Chronic renal failure/insufficiency
- Hematuria
- Neoplasms

Other diseases of the male reproductive system
- Testicular mass
- Torsion of testes

Other urinary tract disorders
- Enuresis

DERMATOLOGY

Acute exanthems
  Varicella
  Zoster
Bacterial infections
Skin eruptions
  Acne vulgaris
  Insect bite (nonvenomous)
  Scabies
  Symptoms involving skin/integumentary tissue
  Other inflammatory condition of skin
Tumors of skin
  Keratoderma (acquired)
  Lipoma
  Neoplasms
  Sebaceous cyst
  Secondary syphilis
  Viral warts
Viral infections

Wounds/injuries
  Burns
  Various open wounds
Other dermatologic/viral infections
  Mumps
  Rubella
  Rubeola
  Varicella
Other diseases of the skin/subcutaneous tissues
  Decubitus ulcer
  Diseases of nails/hair
  Ulcer of lower limbs
Other skin infections
  Candidiasis (mouth, unspecified)
  Cellulitis/abscess (finger, toe, other local infections)
  Impetigo
  Mycoses/dermatophytosis

HEMATOLOGY

Anemias
Bacterial infections
Human immunodeficiency virus
  Autoimmune deficiency syndrome
  Complications associated with human immunodeficiency virus
Ill-defined presentations
  Enlarged lymph nodes
  Fever of unknown origin
  Lymphadenitis (except mesenteric)
  Septic shock

Infectious mononucleosis
Malignant neoplasias
  Leukemias
  Lymphomas (Hodgkin)
Polycythemia
Viral infections
Other hematologic diseases
  Coagulation disorder
  Splenic disorders
  Transfusion reaction

INFECTIOUS DISEASES

Fungal diseases
  Candidiasis
  Cryptococcosis
  Histoplasmosis
  Pneumocystis
Gram negative bacteria
  Gonococcal infections
  Salmonellosis
  Shigellosis
Gram positive bacteria
  Botulism
  Diphtheria
  Tetanus
Mycobacterial disease
Parasitic disease
  Amebiasis
  Chlamydial
  Malaria
  Pinworms
  Toxoplasmosis

Spirochetal disease
  Lyme disease
  Rocky Mountain spotted fever
  Syphilis
Viral diseases
  Cytomegalovirus
  Epstein-Barr virus
  Erythema infectiosum
  Herpes simplex virus
  Human immunodeficiency virus
  Human papillomavirus infections
  Influenzae
  Mumps
  Rabies
  Roseola
  Rubella
  Rubeola
  Varicella-zoster infections

DISCLAIMER

The PACKRAT Topic List, Blueprint, and Core Tasks and Objectives are resources used by PAEA to guide the development of exam content and construction of each exam version. Questions on the exam are considered only a sample of all that might be included in PA education and may not reflect all content identified in the Topic List.

These resources may be useful to students when studying for the exam; however the Topic List is not a comprehensive list of all the exam question topics. PAEA's goal is not to provide a list of all the topics that might be on the exam, but rather to provide students with a resource when preparing for the exam. PAEA recommends that students review the Topic List, Blueprint, and Core Tasks and Objectives in conjunction when preparing for the exam.

Core Tasks & Objectives

PAEA Assessment's Core Tasks and Learning Objectives are assessed by all of the PAEA examinations and should be provided to students in conjunction with the individual examination blueprints and topic lists so students can be prepared for the exams. We recognize that each program will have additional objectives that correspond to their curricula. We encourage programs to tie the PAEA Assessment Core Tasks and Learning Objectives to individual program objectives.

HISTORY TAKING AND PHYSICAL EXAMINATION

- Identify elements of, and need for, comprehensive and focused interviews appropriate for the age and gender of the patient, reason for visit, urgency of the problem, and patient's ability to provide history.
- Recognize and interpret* pertinent historical information.
- Identify history commonly associated with specific medical conditions.
- Identify elements of, and need for, comprehensive and focused physical examinations appropriate for the age and gender of the patient, reason for visit, urgency of the problem, and patient's ability to participate in the examination.
- Identify required techniques in the physical examination.
- Recognize and interpret* pertinent physical examination findings when presented in written or illustrated form.
- Determine the need for other resources (e.g., past records, consultation, other members of the health care team, etc.) to expand knowledge of the patient's history.
- Interpret history and physical examination findings in order to differentiate one disorder from another.

Interpret means to determine whether normal or abnormal, or determine the meaning of the finding relative to pathophysiologic processes and disease.

DIAGNOSTIC STUDIES

- Demonstrate knowledge of appropriate patient and family education related to laboratory and diagnostic studies.
- Identify techniques and potential complications for common diagnostic procedures.
- Select the appropriate initial and subsequent laboratory and diagnostic studies based on initial impressions determined from the history and physical examination or germane to the health-screening situation.
- Identify the indications for specific laboratory and diagnostic studies.
- Identify risks associated with laboratory and diagnostic studies.
- Recognize normal and abnormal values for routine laboratory and diagnostic studies.
- Interpret the results of routine laboratory and diagnostic studies.
- Select appropriate laboratory and diagnostic testing by considering and evaluating the cost, probable yield, invasiveness, and contraindications of laboratory and diagnostic studies.

- Determine if and when additional diagnostic studies are required.
- Identify laboratory and clinical studies considered to be the best for the diagnosis of certain conditions.

DIAGNOSIS

- Determine a differential diagnosis based upon historical information, physical examination findings, and laboratory and diagnostic study findings.
- Select the most likely diagnosis based on historical information, physical examination findings, and laboratory and diagnostic study findings.

HEALTH MAINTENANCE

- Determine appropriate counseling, as well as patient and family education, related to preventable diseases, communicable diseases, immunization schedules, and healthy lifestyles.
- Determine the appropriate history and physical examination in screening an asymptomatic patient during well-care visit based on age.
- Recognize risk factors for conditions amenable to prevention or detection in an asymptomatic individual.
- Recognize the impact of stress on health and the psychological manifestations of illness and injury.
- Recognize the effects of aging and family roles on health.
- Recognize the impact of environmental and occupational exposures on health.
- Recognize the signs and symptoms of abuse and neglect and the indications for intervention and referral.
- Identify common barriers to care.
- Identify the risks and benefits of immunizations.
- Select the appropriate laboratory and diagnostic screening studies and identify normal ranges.
- Identify growth and human development milestones.
- Match anticipatory guidance to the appropriate age level and to the sequelae it is intended to prevent.

CLINICAL INTERVENTION

- Select the application or technique required for common clinical interventions.
- Identify appropriate monitoring for patients after interventions, including checking for compliance, adverse reactions, and effectiveness.
- Recognize appropriate counseling and patient and family education related to clinical interventions.
- Identify proper referral strategies for patients to other services for clinical intervention as appropriate.
- Determine appropriate follow-up from referrals.
- Select a clinical intervention plan that is consistent with the working diagnosis.
- Prioritize clinical interventions in emergent, acute, and chronic care situations.

- Evaluate severity of patient condition in terms of need for medical and/or surgical referral, admission to the hospital or other appropriate setting.
- Determine appropriate surgical treatment and postsurgical/postprocedural management.
- Identify potential complications of specific clinical interventions and procedures.
- Recognize appropriate plans for patient discharge and appropriate medical, surgical, and rehabilitation follow-up.
- Select nonpharmacologic modalities (e.g., physical therapy, surgery, counseling) to integrate into patient management plans.

CLINICAL THERAPEAUTICS

- Identify appropriate counseling and patient and family education related to a clinical therapeutic agent including drug-drug interactions.
- Identify key safety factors related to the administration of medications (oral, topical, sublingual, subcutaneous, intramuscular, rectal, otologic, vaginal, and ophthalmic).
- Recognize appropriate plans to monitor pharmacotherapy, checking for compliance, side effects, adverse reactions, and effectiveness.
- Select a clinical therapeutic plan, that considers the cost, efficacy, possible adverse reactions, contraindications, and drug interactions for medications selected.
- Recognize the pharmacokinetic properties, indications, and contraindications for the use of pharmacologic agents. Apply this knowledge to the safe and effective selection and administration of medications.
- Identify side effects, adverse reactions, contraindications, precautions, therapeutic effects, and dosing of the major classes of clinically important drugs and commonly used medications.
- Identify the risks for, and signs and symptoms of, drug interactions resulting from polypharmacy in the therapeutic regimen.
- Recognize the appropriate actions to take in response to acute, specific drug toxicity.
- Modify therapeutic regimen within the context of continuing care.

SCIENTIFIC CONCEPTS

- Apply basic sciences (anatomy, physiology, microbiology, genetics, etc.) to the diagnosis and management of specific medical conditions.
- Recognize associations of disease conditions and complications through application of scientific concepts.
- Demonstrate understanding of concepts of public health in the management of the population's and an individual patient's health and well-being, as well as disease.
- Identify underlying processes or pathways responsible for a specific condition or disease.

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