Milestones on the Plastic Surgery In-Service Training Examination

Nishant Ganesh Kumar, MD,* Jayson Marwaha, MD,† and Brian C. Drolet, MD‡

*Division of Plastic Surgery, Department of Surgery, University of Michigan Health System, Ann Arbor, Michigan; †Department of Surgery, Medstar Georgetown University Hospital, Washington District of Columbia; and ‡Department of Plastic Surgery, Vanderbilt University Medical Center, Nashville, Tennessee

BACKGROUND: The Plastic Surgery Milestones Project was implemented in 2014 to establish standards for competency based resident education. In restructuring educational activities under the Milestones, various pedagogical tools have been revised. However, these standards have not yet been applied to the Plastic Surgery In-Service Training Examination. The purpose of this study was to determine the representation of the various components of the Plastic Surgery Milestones Project, on the In-Service Training Examination.

METHODS: All questions from the 2014 – 2018 In-Service Examinations were evaluated within the framework of the current Plastic Surgery Milestones. Using content analysis, each Examination question was mapped to a single Milestone. Descriptive analysis of Milestone subject area and Core Competency breakdown, as well as year to year trends, were performed.

RESULTS: Of the 1,150 questions analyzed, there was an unequal representation of individual Milestones (0-7.4%). Of the 36 Plastic Surgery Milestones, 10 represented more than 50% of the PSITEs while 8 Milestones had less than 1% representation. The most common subject area was Head and Neck (12.7%) and least common was Reconstruction of the Trunk and Perineum. Among Core Competencies, more than half (50.4%) tested Patient Care while Interpersonal and Communication Skills was the lowest represented, 0.2%.

CONCLUSIONS: The Plastic Surgery In-Service Examination tests a variable proportion of Milestones. Currently, the PSITE is not well integrated with competency based education in spite of a shift towards such a training model. Going forward, the PSITE may include an associated Milestone with each question in order to better incorporate Competencies into this important annual evaluation metric. (J Surg Ed 76:1370–1375. © 2019 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: In service training examinations, Plastic Surgery, Competency based education, Resident assessment, Milestones, Evaluation

COMPETENCIES: Practice-Based Learning and Improvement, Patient Care, Medical Knowledge

INTRODUCTION

The six Core Competencies from the Accreditation Council for Graduate Medical Education (ACGME) have become a cornerstone of GME in the United States. The Core Competencies were first introduced in 1999 through the Outcome Project,[1] which defined the six domains (Patient Care, Medical Knowledge, Systems-Based Practice, Professionalism, Practice-Based Learning and Improvement, and Interpersonal and Communication Skills) of clinical competency for curriculum and resident evaluations.[2] Building on this framework, the ACGME developed the Next Accreditation System to further the goals of competency-based education. As part of the Next Accreditation System, the Milestones Project was implemented in 2013 for 7 initial specialties and then in 2014 for the remaining 19, including Plastic Surgery. The Milestones emphasize educational outcomes (e.g., Head and Neck Patient Care) over traditional processes such as didactics, clinical rotations and operative case distribution.[3,4]

While the six Core Competencies are common across training programs, each specialty has specific Milestones that were developed in conjunction with the ACGME, American Board of Medical Specialties, and other stakeholders.[5] In 2011, the Plastic Surgery Milestone Working Group was organized with members of the American Board of Plastic Surgery, the American Council of

Funding Statement: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Correspondence: Inquiries to Brian C. Drolet, MD, Department of Plastic Surgery, Medical Center North, D-4219, Nashville, TN 37232; fax: (615) 936-0167; e-mail: brian.c.drolet@gmail.com

  1931-7204/$30.00 https://doi.org/10.1016/j.jsurg.2019.03.014

Academic Plastic Surgeons, the Plastic Surgery Residency Review Committee, program directors, and residents.[6,7] The completed product comprised 36 Milestones. Twenty-eight Milestones consisted of a "Patient Care" and "Medical Knowledge" component for 14 general subject areas (e.g., wound care, tissue transfer, etc.). An additional 8 Milestones were created for the other 4 Core Competencies.[8]

Despite restructuring of most other GME activities to competency-based standards, the Plastic Surgery In-Service Training Examination (PSITE) does not yet reflect these changes.[9-11] The PSITE is administered annually by the American Society of Plastic Surgeons and consists of 5 sections including cosmetic, hand, craniomaxillofacial, comprehensive, and core.[12] The Examination is written and published after a rigorous peer-review process in conjunction with the National Board of Medical Examiners.[13]

The PSITE is taken both by practicing surgeons for Continuing Medical Education and by residents as an annual learning assessment and as preparation for the American Board of Plastic Surgery Certifying Examination. Although the PSITE remains a cornerstone of resident evaluation, it is not yet integrated with competency-based standards that use Milestones and Core Competencies. The purpose of this study was to examine how PSITE questions correlate with the Plastic Surgery Milestones and Core Competencies.

METHODS

Two authors (NGK and BCD) began with a pilot group of questions from the PSITE in order to develop a framework for correlating questions on the In-Service with the Plastic Surgery Milestones. A previously validated

TABLE 1. Milestone Representation (%) for Questions on the PSITE From 2014 to 2018

Milestone	2014	2015	2016	2017	2018	Average
Head and Neck – Patient Care	9.0	9.0	9.2	5.2	4.8	7.4
Upper Extremity Trauma – Patient Care	12.0	6.5	7.6	4.4	4.8	7.1
Congenital Anomalies – Medical Knowledge	6.0	6.0	3.6	4.4	8.4	5.7
Tissue Transfer – Medical Knowledge	5.5	2.5	4.4	7.2	6.8	5.3
Surgical Care – Medical Knowledge	2.5	7.0	4.0	6.8	6.0	5.3
Head and Neck – Medical Knowledge	3.5	3.5	3.2	9.2	6.8	5.2
Facial Aesthetics – Patient Care	6.5	5.0	7.6	2.4	2.0	4.7
Surgical Care – Patient Care	4.5	4.5	6.4	3.2	3.2	4.4
Congenital Anomalies – Patient Care	6.0	5.5	2.4	3.2	4.4	4.3
Non-Trauma Hand – Medical Knowledge	2.0	3.5	2.4	7.6	5.6	4.2
Wound Care – Patient Care	3.5	3.5	4.8	3.6	3.6	3.8
Non-Trauma Hand – Patient Care	6.0	4.0	4.4	1.6	2.8	3.8
Non-Cancer Breast Surgery – Patient Care	4.5	5.0	3.6	2.0	2.8	3.6
Non-Cancer Breast Surgery – Medical Knowledge	2.0	3.5	2.0	5.6	4.0	3.4
Facial Aesthetics – Medical Knowledge	4.0	2.0	2.4	4.0	2.8	3.0
Upper Extremity Trauma – Medical Knowledge	3.0	1.5	3.2	3.6	3.6	3.0
Wound Care – Medical Knowledge	1.0	3.5	2.8	3.2	3.6	2.8
Systems-Based Practice – Practice Management	1.0	2.5	1.6	4.0	3.6	2.5
Lower Extremity – Patient Care	2.5	3.0	2.0	2.8	0.8	2.2
Breast Reconstruction – Medical Knowledge	1.5	2.0	1.2	2.4	4.0	2.2
Breast Reconstruction – Patient Care	1.5	2.5	5.6	0.0	1.2	2.2
Maxillofacial Trauma – Medical Knowledge	1.0	2.0	0.8	3.2	2.8	2.0
Cosmetic Surgery of the Trunk and Lower Extremity – Patient Care	2.0	3.0	3.2	0.8	0.8	2.0
Reconstruction of the Trunk and Perineum – Patient Care	1.0	3.0	2.8	1.6	0.4	1.8
Maxillofacial Trauma – Patient Care	2.0	1.0	2.4	1.2	2.0	1.7
Tissue Transfer – Patient Care	2.5	1.5	2.8	0.8	0.4	1.6
Lower Extremity – Medical Knowledge	1.0	0.5	0.8	1.6	1.2	1.0
Cosmetic Surgery of the Trunk and Lower Extremity – Medical Knowledge	0.5	0.0	0.8	0.8	2.8	1.0
Professionalism – Ethics and Values	2.0	1.0	0.0	0.4	1.2	0.9
Systems-Based Practice – Patient Safety	0.0	1.0	0.8	0.8	0.8	0.7
Reconstruction of the Trunk and Perineum – Medical Knowledge	0.0	0.5	0.0	1.6	1.2	0.7
Practice-Based Learning and Improvement – Research and Teaching	0.0	0.0	0.8	0.8	0.8	0.5
Interpersonal Communication Skills	0.0	0.5	0.4	0.0	0.0	0.2
Systems-Based Practice – Resource Allocation	0.0	0.0	0.0	0.0	0.0	0.0
Practice-Based Learning and Improvement – Investigate, Evaluate, Assimilate	0.0	0.0	0.0	0.0	0.0	0.0
Professionalism – Personal Accountability	0.0	0.0	0.0	0.0	0.0	0.0

PSITE, Plastic Surgery In-Service Training Examination.

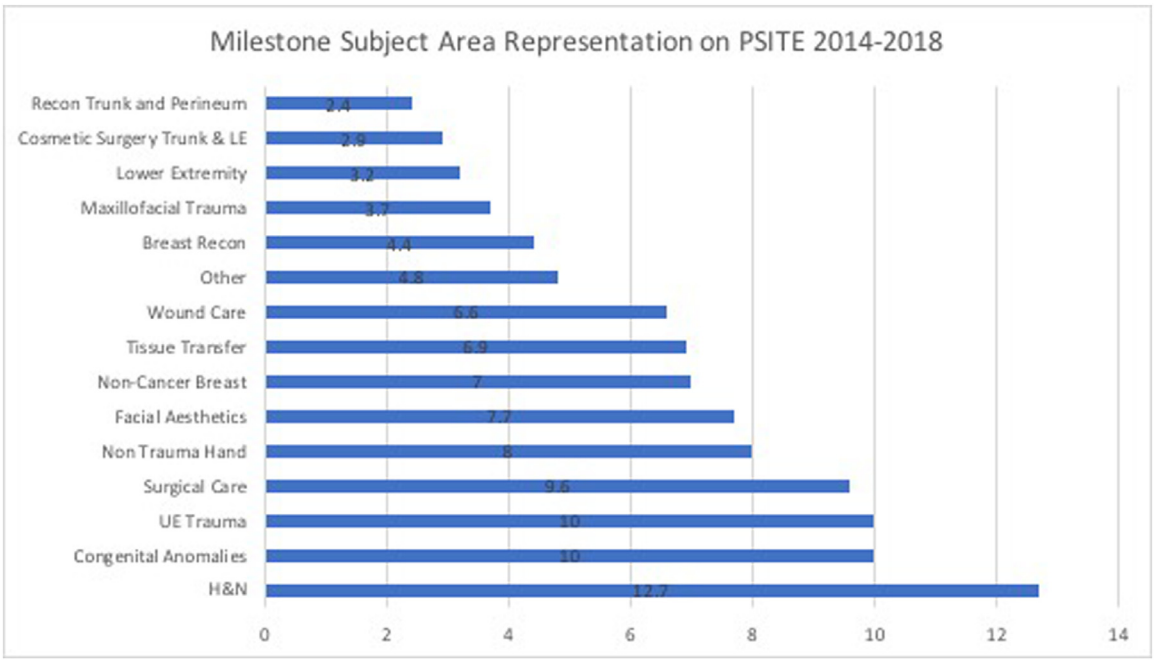

FIGURE 1. Milestone Subject Area representation (%) for questions on the PSITE from 2014 to 2018.

content analysis methodology was used to define common themes in the questions, develop rules for assignment of the Milestones, and finally to synthesize the text into a quantitative format.[14,15] The authors discussed the appropriate assignment of Milestones to the pilot questions from each of the major test sections. Parameters for assignment were based on the theme of the question and specific rules for assignment that were developed during this pilot phase (Appendix). Both authors then completed an independent review of 5 years of the PSITE (2014-2018). Each question was assigned an individual Milestone from the 36 listed in

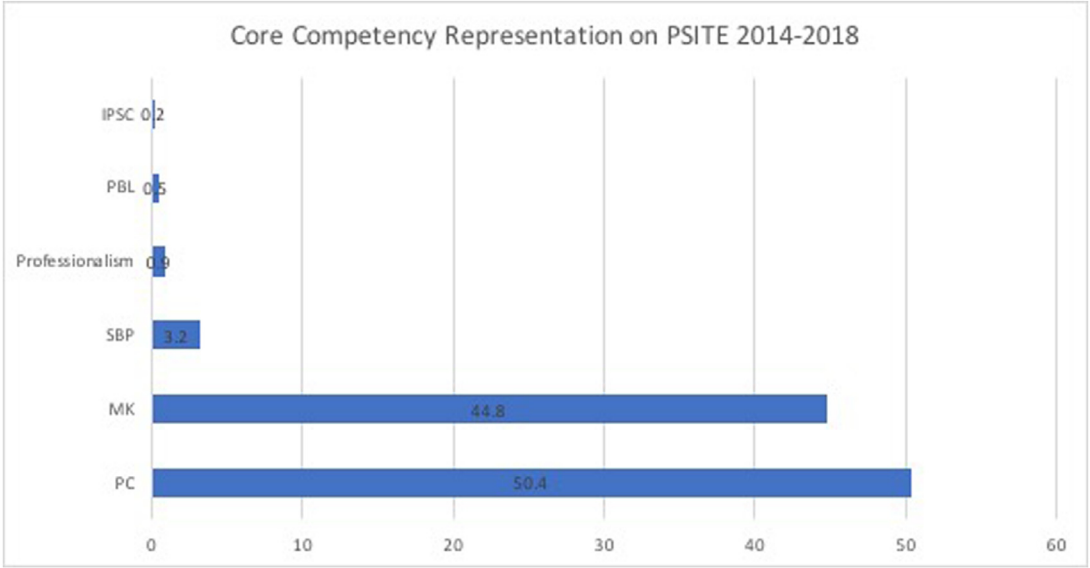

FIGURE 2. Core Competency representation (%) for questions on the PSITE from 2014 to 2018. PSITE, Plastic Surgery In-Service Training Examination; PC, Patient Care; MK, Medical Knowledge; SBP, Systems-Based Practice; PBL, Practice-Based Learning and Improvement; IPCS, Interpersonal and Communication Skills. *Each Subject Area representation was determined by combining the Patient Care and Medical Knowledge components of respective Milestones. "Other" includes topics covered by the Milestones under the Core Competencies of Systems-Based Practice, Practice-Based Learning and Improvement, Interpersonal and Communication Skills and Professionalism.

the Plastic Surgery Milestones Project. Since each Milestone is a component of 1 of the 6 Core Competencies, the distribution of Core Competencies was determined as well. Any differences in classification through the independent review were resolved by discussion until a consensus was reached. All questions from the PSITEs were included for analysis, regardless of whether a question was eventually discarded during scoring or post-examination review, as the preliminary published PSITE was felt to best reflect the intended distribution of topics to be tested. Data were stored and descriptive statistics were performed in a database using Microsoft Excel (Microsoft Corp, Redmond, Washington).

RESULTS

A total of 1150 questions were analyzed. There was an unequal representation of individual Milestones (0%-7.4%, Table 1). Of the 36 Plastic Surgery Milestones, 10 represented more than 50% of the PSITEs while 8 Milestones had less than 1% representation across the PSITEs and 3 Milestones had no representation. The most common subject areas were Head and Neck (12.7%) and Upper Extremity Trauma (10.0%); Reconstruction of the Trunk and Perineum was the least represented (2.4%; Fig. 1).

Of the most represented subject areas, the associated Core Competencies for Head and Neck (7.4%) and Upper Extremity Trauma (7.1%) related to Patient Care were followed by Congenital Anomalies (5.7%), Tissue Transfer (5.3%), and Surgical Care (5.3%) that tested Medical Knowledge. Among all Core Competencies, more than half (50.4%) tested Patient Care followed by Medical Knowledge (44.8%; Fig. 2). Practice-Based Learning, Professionalism and Interpersonal and Communication Skills were the lowest represented competencies (0.5%, 0.9%, and 0.2% respectively).

DISCUSSION

In this study, we analyzed the content of the PSITE using the ACGME Plastic Surgery Milestones. This categorization demonstrates a descriptive breakdown of subject areas and competencies tested on the PSITE. Not surprisingly, we found that this standardized, multiple choice examination most commonly tested Patient Care and Medical Knowledge. Other Core Competencies, like Professionalism, were tested less frequently. Importantly, the analysis demonstrates that although the PSITE is not written by competency-based standards, the Milestones can provide a template for describing the content. Therefore, instead of dividing the PSITE into 5 sections, it could be more beneficial for residents and educators if the Examination was standardized to Competencies and Milestones.

Although prior authors have looked at PSITE subject distribution, these methods were not based on an established framework like the Milestones.[16,17] Educators and trainees can use our results to focus didactics for the PSITE. Importantly, we found a relatively constant subject distribution over the years studied, demonstrating validity and an intentional curriculum in PSITE writing. Using the Milestones to categorize subject distribution on the PSITE may help inform writers on the test subject distribution as well.

Of the Core Competencies, Patient Care was the most emphasized (Fig. 2), which is similar to findings of earlier studies demonstrating a greater focus on patient care over direct recall.[16-20] This is an important reflection of the goals in writing the PSITE, which seeks to assess test-takers ability to understand more complex patient-oriented situations than rote memorization that is associated with medical knowledge type questions.[21]

Another finding was a low representation of 4 of the 6 Core Competencies: Systems-based Practice, Practice-based Learning and Improvement, Professionalism, and Interpersonal and Communication Skills (less than 5% of content). Given the rigorous and evidence-based guidelines to writing questions on the PSITE,[21] it may not be the best means for evaluating these Core Competencies. Indeed, these Competencies may be better assessed through direct patient, staff, and faculty interactions seen in the clinical setting or via 360° evaluations. However, given that the ITEs are administered nationally among all residents, questions related to these Competencies can be standardized across multiple ITEs to ensure a basic understanding of physician professional responsibilities. The use of multiple choice questions via ITEs to evaluate and assess these competencies has been used with success in other specialties.[22] Information obtained from ITEs can then be used to supplement the assessments obtained through some of the other methods listed above for such competencies.

The results of this study suggest that it may be useful to indicate a Milestone subject area for each question on future PSITEs. This could be used as an additional tool to determine resident strengths in each Milestone and corresponding Core Competency. Future work could then be directed toward studying how resident performance in the Competencies on the PSITE correlate with their Milestone evaluations during clinical duties. Since ITEs such as the PSITE represent one of the few resident evaluation tools that is standardized and objective, its use in better testing all the Competencies needs to be reconsidered. While not all Competencies can be represented equally on the PSITE, a better representation of the Core Competencies related to professionalism, practice-based

learning, interpersonal communication, and systems-based practice, may ensure standardization of such knowledge among residents taking the PSITE nationally. Such steps could help better integrate the PSITE within the model of competency-based education and along with other evaluation tools (e.g., direct observation, clinical simulations, 360˚ evaluations) could be used to provide more meaningful resident feedback and training.

This study has several limitations. First, the sample is limited to the 5 PSITEs written since implementation of the Milestones. Therefore, this is not an exhaustive description of all In-Service Examination content trends over time. Second, the content analysis is quasi-qualitative and subject to some reviewer interpretation. However, 2 authors conducted independent reviews to minimize bias and the high specificity of Milestone descriptions minimized subjectivity during categorization.

CONCLUSIONS

The PSITE is one of the primary performance metrics for plastic surgery residents along with Milestone and Core Competency assessments. However, the PSITE is not yet based in competency metrics. This study demonstrates that the Milestones can be used to generate a descriptive breakdown of subject and competency areas on the PSITE. Incorporating Milestones into PSITEs, by providing a Milestone as part of the reference material for each question, may be useful for better integrating this central evaluation tool in providing robust resident feedback.

CONTRIBUTION STATEMENT

All authors have contributed substantially through conception, design, data acquisition, analysis and interpretation, and have contributed with drafting, reviewing and approving the final version.

REFERENCES

1. Dietl CA, Russell JC. Effect of process changes in surgical training on quantitative outcomes from surgery residency programs. *J Surg Educ*. 2016;73(5):807–818. https://doi.org/10.1016/j.jsurg.2016.03.015. Epub 2016 May 4.
2. Swing SR. The ACGME outcome project: retrospective and prospective. *Med Teach*. 2007;29:648–654.
3. Nasca TJ, Philibert I, Brigham T, Flynn TC. The next GME accreditation system—rationale and benefits. *N Engl J Med*. 2012;366:1051–1056.
4. Luce EA. Discussion: competency, the NAS, and the milestones: sea change or deluge? *Plast Reconstr Surg*. 2016;137:1334–1336.
5. Swing SR, Beeson MS, Carraccio C, et al. Educational milestone development in the first 7 specialties to enter the Next Accreditation System. *J Grad Med Educ*. 2013;5:98–106.
6. Buck DW 2nd, McGrath MH. The plastic surgery milestones: friend or foe? *J Craniofac Surg*. 2015;26:2254–2256.
7. Sillah NM, Ibrahim AM, Lau FH, et al. The new accreditation council for graduate medical education Next Accreditation System milestones evaluation system: what is expected and how are plastic surgery residency programs preparing? *Plast Reconstr Surg*. 2015;136:181–187.
8. Surgery TACfGMEaTABoP. The Plastic Surgery Milestone Project 2015 Available from: https://www.acgme.org/Portals/0/PDFs/Milestones/PlasticSurgeryMilestones.pdf.
9. Cooney CM, Cooney DS, Bello RJ, Bojovic B, Redett RJ, Lifchez SD. Comprehensive observations of resident evolution: a novel method for assessing procedure-based residency training. *Plast Reconstr Surg*. 2016;137:673–678.
10. Kobraei EM, Bohnen JD, George BC, et al. Uniting evidence based evaluation with the ACGME plastic surgery milestones: a simple and reliable assessment of resident operative performance. *Plast Reconstr Surg*. 2016;138(2):349e–357e. https://doi.org/10.1097/PRS.0000000000002411.
11. Knox AD, Gilardino MS, Kasten SJ, Warren RJ, Anastakis DJ. Competency-based medical education for plastic surgery: where do we begin? *Plast Reconstr Surg*. 2014;133:702e–710e.
12. Surgeons ASoP. In-Service Exam. Your Exam. Your Specialty. Your Way. 2016 Available from: https://www.plasticsurgery.org/for-medical-professionals/resources-and-education/meetings/in-service-exam.html.
13. Silvestre J, Chang B, Serletti JM. The Plastic Surgery In-Service Training exam for board preparation. *Plast Reconstr Surg*. 2016;137:260e–261e.

14. Riff D, Lacy S, Fico F. Analyzing Media Messages: Using Quantitative Content Analysis in Research. Routledge; 2014.

15. Ganesh Kumar N, Benvenuti MA, Drolet BC. Aligning in-service training examinations in plastic surgery and orthopaedic surgery with competency-based education. *J Grad Med Educ*. 2017;9:650–653.

16. Silvestre J, Basta MN, Serletti JM, Chang B. Evaluation of the Plastic Surgery In-Service Training exam: lower extremity questions. *J Surg Educ*. 2015;72:875–881.

17. Silvestre J, Taglienti AJ, Serletti JM, Chang B. Analysis of cosmetic topics on the Plastic Surgery In-Service Training exam. *Aesthet Surg J*. 2015;35:739–745.

18. Silvestre J, Levin LS, Serletti JM, Chang B. The plastic surgery hand curriculum. *Plast Reconstr Surg*. 2015;136:1239–1247.

19. Silvestre J, Lin IC, Chang B, Levin LS. Unique assessment of hand surgery knowledge by specialty. *Plast Reconstr Surg*. 2016;137:917–924.

20. Silvestre J, Chang B, Taylor JA. Analysis of an in-service examination for core pediatric craniofacial surgery knowledge. *J Surg Educ*. 2016;73(3):375–380. https://doi.org/10.1016/j.jsurg.2015.12.008. Epub 2016 Feb 6.

21. Girotto JA, Glassman LS. Commentary on: analysis of cosmetic topics on the Plastic Surgery In-Service Training exam. *Aesthet Surg J*. 2015;35:746–747.

22. Webster JB. Incorporation of core competency questions into an annual national self-assessment examination for residents in physical medicine and rehabilitation: results and implications. *PM R*. 2009;1:229–233.

SUPPLEMENTARY INFORMATION

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.jsurg.2019.03.014.

APPENDIX A. GUIDELINES FOR QUESTION CLASSIFICATION

Questions that required a diagnosis based on imaging, histopathology, or physical exam findings were considered to represent "Patient Care" while questions that required a diagnosis based on a constellation of symptoms for a syndrome or congenital anomalies were considered "Medical Knowledge." Questions that explored the benefits, risk factors, and complications of a procedure or treatment plan were more likely to represent "Patient Care." Questions that required knowledge of medical anatomy fell under the category of "Medical Knowledge." Questions that required knowledge of the risk factors for a patient for disease prognosis were more likely to represent "Medical Knowledge." Finally, questions that required the awareness of current guidelines for screening or time intervals for preventative care measures were more likely to represent "Medical Knowledge."