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Current Views on the New United States Medical Licensing Examination Step 1 Pass/Fail Format: A Review of the Literature



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ABSTRACT

Introduction: Residency programs have historically used numerical Step 1 scores to screen applicants, making it a career-defining, high-stakes examination. Step 1 scores will be reported as pass/fail starting in January 2022, fundamentally reshaping the residency application review process. This review aimed to identify opinions of physicians and medical students about the new format, identify arguments in support of or against the change, and determine the implications of this change on the residency selection process. **Methods:** A comprehensive PubMed review was performed in May 2021 to identify articles that discussed the new Step 1 format. Non-English and duplicate articles were excluded. Data collected from each article included publication year, specialty, subjects, and key findings.

Results: A total of 81 articles were included, 26 of which discussed the impact of the new format within surgical fields (32.1%). Remaining articles discussed the implications within the medical community as a whole ($n = 33$, 40.7%) and nonsurgical fields ($n = 22$, 27.2%). Studies suggest Program Directors will rely on Step 2 Clinical Knowledge (CK) scores, medical school reputation, applicant familiarity, Dean's letters, recommendation letters, and research in lieu of numerical Step 1 scores. In addition, concerns have been raised that the new format will disadvantage international, osteopathic, and minority applicants while increasing stress surrounding Step 2 CK.

Conclusions: Within the medical community, there are concerns that Step 2 CK will be used to substitute Step 1 and that resident diversity will diminish due to the new Step 1 format. Holistic candidate consideration will be increasingly important.

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Introduction

The United States Medical Licensing Examination (USMLE) was created by the National Board of Medical Examiners

(NBME) so that the process of granting interstate physician licensure could be simplified.^{1,2} Step 1 is one of several USMLE examinations that medical trainees must pass before licensing, also including Step 2 Clinical Knowledge (CK) and

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Step 3.³ Although USMLE examinations were not intended to assess a candidate's preparation for postgraduate medical training, numerical Step 1 scores have been widely used by medical training programs to screen candidates during the residency application process.¹⁻⁷

The use of Step 1 as a screening tool may, in part, be owed to the high quantity of candidates applying to a limited number of training positions.^{1,2} Since 1996, the number of training positions available per applicant has hovered around 0.8 despite an increase in total positions.^{1,2} With the ease of online application submission through the Electronic Residency Application System, candidates overapply to available positions to increase their chance of matching.^{2,8,9} Of all fields, Integrated Plastic Surgery has one of the highest rates of application submissions per individual. Each Integrated Plastic Surgery applicant in the 2020-2021 cycle submitted an average of 58.7 applications, while each program received an average of 297.6 total applications for their 1-4 open positions.^{10,11} This process comes at a high cost to medical students across specialties. US students pay an average of \$1499 in Electronic Residency Application System fees, compounded by the cost of in-person interviews, which, on average, can be upward of \$6690 ± \$4045 for individuals applying to competitive fields.¹²⁻¹⁹ With hundreds of competitive applicants to sort through, residency programs use Step 1 scores as an objective standardized tool to limit the number of applications that will subsequently undergo a more thorough review.^{2,20}

Increasing evidence has demonstrated the significance of Step 1 scores on medical graduates' career options.^{1,2} For competitive specialties, such as Integrated Plastic and Reconstructive Surgery, the average for matched US allopathic candidates was considerably higher than other specialties in 2020, such as family medicine (249 versus 221).²¹ Because of this reality, preclinical students may prioritize studying for Step 1 at the expense of holistic training and their own well-being.^{1,2}

In light of these issues, the decision was made to change Step 1 scoring from numeric to pass/fail as early as January 2022, fundamentally reshaping the residency selection process.^{4-6,22,23} This review sought to identify the opinions of the medical community on the new Step 1 format and identify the implications of this decision on the residency selection process.

Methods

A review of the literature was performed in March 2021 according to guidelines.^{24,25} Peer-reviewed articles were identified by a single author (L.N.R.) using PubMed. The search phrase ("USMLE"[All Fields] OR "United States Medical Licensing Examination"[All Fields] OR "Step 1"[All Fields]) AND ("Pass"[All Fields] AND "Fail"[All Fields])" was used to identify articles related to the new Step 1 format. The literature was broadly surveyed, and all articles were included that discussed the risks and benefits of changing Step 1 from a numerical to pass/fail format. Articles were screened by title and

Table 1 – Inclusion and exclusion criteria for articles selected to examine.

Inclusion criteria
Assesses current opinions on the new binary, nonnumerical scoring system for USMLE Step 1, and/or the implications of this change in the medical community
Exclusion criteria
Duplicate
Non-English
Does not meet inclusion criteria

abstract, using inclusion and exclusion criteria listed in Table 1. Full-text review was performed on remaining articles. No limitation was placed on publication status or type of article. Articles with quantitative results were included to identify the distribution of opinions within the medical community, whereas qualitative articles (viewpoints, letters to the editor, etc.) were included to identify common themes. Discussions in the literature surrounding the risks and benefits of the score change have been ongoing for almost a decade, so no limitation was placed on publication year to ensure all viewpoints leading up to the decision and proceeding it were discussed. Exclusion criteria were set to eliminate duplicate and non-English articles. Data were manually extracted, as available, and stored using a standardized spreadsheet. The categories of data extracted from each study are listed in Table 2. The field of each publication was determined through the text or journal. No limitation was placed on the publication specialty, and both surgical and nonsurgical publications were included. Articles that discussed the impact of the change on the medical community as a whole with no specialty specified were also included. Surgical publications were categorized under general surgery unless a subspecialty was specified by the title, content, or journal.

Results

Selection of studies

PubMed search yielded 121 publications, which were screened by the title and abstract (Fig. 1). Of these, 93 underwent full-text review. After screening, 81 publications met inclusion and exclusion criteria. Excluded articles ($n = 40$) were eliminated because they did not discuss the new Step 1 format.

Study characteristics

Discussion surrounding the risk and benefits of changing Step 1 scoring to pass/fail were published in the literature as early as 2011 ($n = 1, 1.2\%$),²⁶ although most of the literature on this topic was published in 2020 ($n = 48, 59.3\%$)^{1,5,23,27-71} (Fig. 2), which coincided with the score change decision. Remaining articles were published in 2018 ($n = 1, 1.2\%$),⁷² 2019 ($n = 7, 8.6\%$),^{2,11,73-77} and 2021 ($n = 24, 29.6\%$).^{5,20,78-99} Of 81 publications, 26 discussed

Table 2 – Data extracted from included publications.

Year
Title
Journal
Author
Specialty
Publication type
Number of participants
Quantitative or qualitative outcomes
Themes

the new format within the context of surgical fields (32.1%; Fig. 3). These included publications in the fields of urology (n = 2, 2.5%),^{36,43} otolaryngology (n = 2, 2.5%),^{90,98} general (n = 7, 8.6%),^{27,30,54,55,65,87,96} plastic and reconstructive (n = 5, 6.2%),^{5,6,28,32,34} orthopedic (n = 2, 2.5%),^{20,38} cardiothoracic (n = 2, 2.5%),^{79,88} neurosurgery (n = 2, 2.5%),^{42,45} and multiple surgical fields (n = 4, 4.9%).^{50,81,89,95} Of the later, several also assessed various nonsurgical fields.^{50,81,89} Remaining articles discussed the impact of the new format within the medical community as a whole (n = 33, 40.7%)^{1,11,23,26,31,33,39,40,44,47,48,53,57-62,67-70,72,73,75,78,80,82,84,91,93,97,99} and nonsurgical fields (n = 22, 27%), including radiology (n = 12, 14.8%),^{2,29,35,46,49,52,56,71,74,76,77,86} anesthesiology (n = 3, 3.7%),^{41,51,63} internal medicine (n = 2, 2.5%),^{37,64} dermatology (n = 2, 2.5%),^{66,92} radiation oncology (n = 1, 1.2%),⁹⁴ physical medicine and rehabilitation (PM&R; n = 1, 1.2%),⁸⁵ and family medicine (n = 1, 1.2%).⁸³

Quantitative results were presented in 27 articles (33.3%) listed in Table 3, which included mostly survey studies (n = 21, 25.9%)^{5,6,26,33,36-38,40-42,45,49,50,63,64,66,71,81,85,90,95} and several observational studies (n = 6, 7.4%).^{51,52,56,83,89,99} Remaining articles included viewpoints, commentaries, editorials, replies, and letters to the editor (n = 51, 63.0%),^{1,2,11,23,27-32,34,35,39,44,46-48,53-55,57-62,65,67-70,72-80,82,84,86-88,91,92,94,96-98} as well as reviews (n = 3, 3.7%).^{20,43,93}

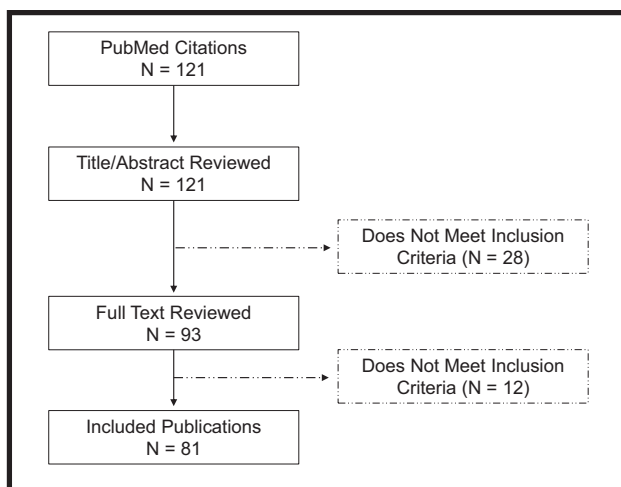


Fig. 1 – PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flowchart.

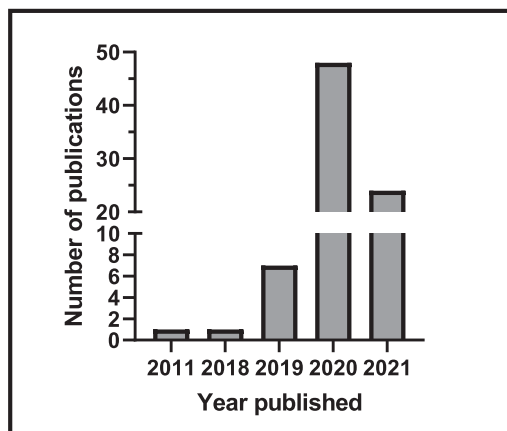


Fig. 2 – A graphical history of the published studies addressing perceptions on and implications of the pass/fail United States Medical Licensing Examination (USMLE) Step 1 Format.

Opinions on the new Step 1 format

There were 20 studies in the literature, which presented quantitative data on the opinions of medical professionals on the new Step 1 format. Various specialties were sampled. Opinions of program directors (PDs), faculty, residents, and/or medical students were all demonstrated. The majority opinion, sample population, number of individuals, and percent of the total surveyed population for each of these articles are listed in Table 4.

Articles that were included in this study assessed opinions within both surgical and nonsurgical specialties. These include otolaryngology,^{50,90} urology,^{36,50} neurosurgery,^{42,45,50} orthopedic,^{38,50} plastic and reconstructive,^{5,6,50,95} colon and rectal,⁵⁰ general,^{50,95} thoracic,^{50,95} and vascular surgery.^{50,95} In addition to these surgical fields, opinions within the fields of allergy and immunology,⁵⁰ anesthesiology,^{41,50,63}

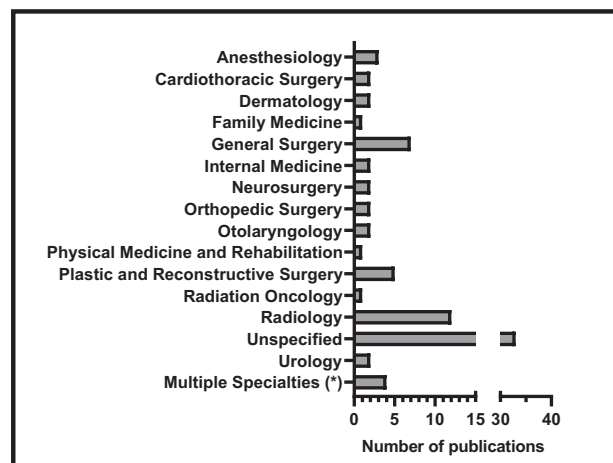


Fig. 3 – The number of publications by specialty. *Multiple specialties include four studies with subjects in 4, 25, 28, and 30 different specialties.

Table 3 – Summary of quantitative data demonstrating the opinions on and/or implications of the pass/fail Step 1 format.

Source	Specialty	Subjects	Majority opinion	Concerns	Support	Implications
Asaad et al. 2021 ⁵	Plastic surgery	18 plastic surgery PDs	83% disagreed	50% agreed MDs and DOs will be equally impacted, 28% agreed MDs will be more impacted, and 22% agreed DOs will be more impacted.	N/A	Personal prior knowledge of the applicant was rated most important, followed by LORs, Step 2 CK scores, and away rotations at the institution of interest. A standardized plastic surgery assessment was supported by 67% of respondents.
Bird et al. 2021 ⁸¹	Various	364 faculty, including PDs (89%) program administrators (6%), associate PDs (2%), core faculty (2%), and department chairs (1%)	N/A	N/A	N/A	A 59% majority agreed MSPE importance will increase, with professionalism (81%) and academic history (78%) being most important. A 90% majority agreed Step 2 CK score importance will increase.
Busha, et al. 2021 ⁸³	Family medicine	97 family medicine residents	N/A	USMLE scores, positively correlated with initial American Board of Family Medicine in-training examinations.	No correlation of USMLE scores with performance on ACGME competency domain assessments was found.	Step 1 scores may predict American Board of Family Medicine in-training examination performance, but not performance on ACGME competency domain assessments.
Carmody et al. 2020 ¹	None	2856 medical students	55% agreed	A 64% majority agreed students from top-tier medical schools will gain an advantage.	86% of respondents agreed Step 1 demonstrated test taking skills over clinical skills, 64% were less engaged in non-Step 1–related classroom content than Step 1 content, 82% agreed they will devote more time to patient care, and 61% agreed nonnative English speakers were disadvantaged by Step 1.	In free-text responses, students most frequently suggested a stronger emphasis on letters of recommendation, grades and academic performance, and extracurricular activities, including research, volunteering, and publications to evaluate candidates.
Chator et al. 2021 ⁸⁵	PM&R	39 PM&R PDs	51.3% disagreed	Most PDs agreed objective comparison of applicants will be harder (80%), and screening will be more arduous (72%). The majority was neutral on whether it will decrease students' basic science knowledge (46%) and the impact on IMGs (46%).	Only 10% agreed socioeconomic disparity in the application process will decrease. The majority was neutral about whether this will improve student well-being (41%).	An 80% majority agreed the importance of Step 2 CK performance will increase, and most agreed medical school reputation importance will also increase (42%). Only 5% will add a supplemental application.
Chisholm and Drolet 2020 ³⁶	Urology	65 urology PDs	58.7% disagreed	Most PDs agreed objective comparison of applicants will be harder (84.6%) and more arduous (76.2%). A slight majority agreed IMGs will be disadvantaged (39.1%). Most were neutral about whether students' basic science knowledge will decrease (35.9%).	Only 10.8% agreed socioeconomic disparity in the application process will decrease, and only 18.8% agreed it will improve medical student well-being.	Most PDs agreed they will increase emphasis on Step 2 CK (84.6%). Few PDs will add a supplemental application (18.5%). The majority agreed that medical school reputation will be more important (58.7%).

Choudhary et al. 2021 ³⁷	Medicine	206 internal medicine PDs	73.2% disagreed	Most PDs agreed objective comparison of applicants will be harder (81.2%) and more arduous (74.8%), that IMGs will be disadvantaged (55.8%), and students' knowledge of basic sciences may decrease (42.2%).	Only 11.7% agreed it will decrease socioeconomic disparities, and 18.9% agreed it will improve student well-being.	83.6% agreed that they will require Step 2 CK scores, and 88.4% said they will increase the emphasis on Step 2 CK scores. Most agreed medical school reputation will be more important (57.3%).
Cohn et al. 2020 ³⁸	Orthopedic	78 orthopedic PDs	83.3% agreed numerical scoring was valuable	N/A	N/A	Most agreed Step 2 CK scores will be highly encouraged (89.7%), and its importance will increase (59%). Application aspects were ranked by importance from 1 to 10 as follows: Sub-internship performance (9.05), interview performance (7.49 to 9.01), medical school rank (7.95), recommendation letters (7.90), and Step 2 CK score (7.27).
Ehrlich et al. 2021 ⁴⁰	None	215 medical students	53.5% disagreed	Osteopathic versus allopathic students were more likely perceive binary scoring as a disadvantage for the match (aOR = 1.454, 95% CI: 0.515, 4.106) and specialty of choice (aOR = 3.187, 95% CI: 0.980, 10.359).	N/A	57.7% of students agreed they will change how they study for Step 1, 52.6% agreed they will spend less money on preparatory services, and 41.4% agreed they will spend less on question banks.
Erath et al. 2020 ⁴¹	Anesthesia	72 anesthesiology PDs	74% disagreed	Most PDs agreed objective comparison of applicants will be harder (81%) and more arduous (83%). The majority agreed students' basic science knowledge will decrease (39%). Fifty-six percent agreed IMGs will be disadvantaged.	Only 15% agreed student well-being will increase, and 7% agreed socioeconomic disparity in the residency application process will decrease.	The majority agreed the importance of Step 2 CK will increase (92%). Eighty-one percent will require Step 2 CK scores. The majority agreed the importance of medical school reputation will increase (61%). Only 8% will add a supplementary application.
Filiberto et al. 2021 ⁸⁹	Various	244 residents	N/A	N/A	N/A	Better performance as an intern, evaluated according to ACGME competencies, was associated with higher Step 1 ($P = 0.006$), Step 2 CK ($P = 0.030$), medical school GPA ($P = 0.020$), and class rank ($P = 0.016$), so programs can use other metrics to evaluate candidates.
Ganesh Kumar et al. 2020 ⁴²	Neurosurgery	48 neurosurgery PDs	79% disagreed	Most PDs agreed objective applicant comparison will be harder (85%) and more arduous (80%), that IMGs will be disadvantaged (63%), and medical students' basic science knowledge will decrease (52%).	Only 10% agreed socioeconomic disparity in the application process will decrease, and 15% agreed new scoring will increase medical student well-being.	The majority agreed the importance of Step 2 CK will increase (88%), and most will require it (85%). Most agree that the importance of medical school reputation will increase (71%).

(continued)

Table 3 – (continued)

Source	Specialty	Subjects	Majority opinion	Concerns	Support	Implications
Goshtasbi et al. 2021 ⁹⁰	ENT	257 ENT faculty	68.1% disagree	Most respondents agreed applicant stress about obtaining interview invites will increase (59.1%), IMGs will be disadvantaged (51.4%), along with DOs (45.9%).	The majority disagreed that student wellness will increase (38.9%) and that underrepresented students will benefit (36.9%).	The majority agreed Step 2 CK's importance will increase (89.1%), along with core clerkship grades (80.9%), away rotations (65.7%), AOA and other awards (64.6%), letters of recommendation (63.8%), and medical school prestige (70.8%).
Huq et al. 2020 ⁴⁵	Neurosurgery	59 neurosurgery PDs and 16 associate PDs	79% disagreed	Most PDs agreed students will be at a disadvantage if from a lower ranked medical school (60%), but only 29% agreed IMGs will be disadvantaged. Most PDs agreed students from prestigious schools will benefit (57%).	N/A	Most agreed Step 2 CK will have increased importance (47%), research productivity will increase (49%), and the number of neurosurgery applicants will increase (73%).
Lewis et al. 2011 ²⁶	None	732 third- and fourth-year medical students	60% disagreed	Those who disagreed with the change were more likely to agree the examination accurately estimated knowledge (OR, 4.23; CI, 2.41-7.43; P < 0.001) and agree that the acquisition of knowledge will decrease (OR, 10.15; CI, 3.32-31.02; P < 0.001).	N/A	N/A
Lin et al. 2020 ²³	Plastic surgery	164 applicants, 64 PDs	60.3% of applicants and 81.0% of PDs disagreed	82.8% of PDs agreed objective comparison of applicants will be harder. 57.8% of PDs and 56.1% of applicants disagreed that socioeconomic disparities in the application process will diminish.	Only 15.6% of PDs agreed it will increase student well-being, whereas the majority of applicants agreed it will increase well-being (43.9%).	95.7% of applicants and 82.8% of PDs agreed that Step 2 CK will be more important. 91.5% of applicants and 52.4% of PDs agreed that medical school reputation will be more important. Most agreed dedicated research time will be more important (87.9% applicants, 45.3% PDs). Applicants (66.4%) and PDs (53.1%) both agreed that there will be an increase in plastic surgery applicants.
MacKinnon et al. 2021 ⁴⁹	Radiology	140 radiology PDs	69.6% disagreed	Most PDs agreed it will be harder to objectively compare applicants (90.7%) and will become more arduous (82.9%). 55.0% said it will disadvantage IMGs. A majority agreed medical students' basic science knowledge will decrease (46.4%).	Only 11.4% agreed socioeconomic disparity in the application process will decrease, and only 21.6% agreed the change will improve medical student well-being.	The majority agreed Step 2 CK importance will increase (89.3%) along with medical school reputation (72.7%).

Makhoul et al. 2020 ⁵⁰	Various	2095 PDs	60.8% disagreed	The majority agreed it will be harder to objectively compare applicants (77.2%) and that IMGs will be disadvantaged (44.4%). The majority were neutral about whether medical students' basic science knowledge will decrease (37.4%).	Only 14.4% agreed socioeconomic disparities will decrease, and only 24.9% agreed medical student well-being will increase.	The majority of respondents agreed Step 2 CK importance will increase (80.7%) and will be required (77.1%). The majority agreed that the importance of medical school reputation will increase (56.8%).
Markham, et al. 2020 ⁵¹	Anesthesia	92 anesthesiology residents	N/A	Step 1 scores independently predicted success on the BASIC examination (OR 1.11, 95% CI 1.05-1.17, $P < 0.001$). USMLE Step 2 score predicted BASIC examination success (OR 1.10, 95% CI 1.04-1.18, $P = 0.001$), but not after Step 1 score adjustments using multiple logistic regression.	N/A	It will be harder to predict anesthesiology candidates' performance on the BASIC examination without Step 1 scores.
Maxfield and Grimm 2020 ⁵²	Radiology	157 radiology residents	N/A	Of biographical, undergraduate, and medical school (grades, USMLE Step 1 score, Alpha Omega Alpha membership, letters of recommendation, publications) data, only Step 1 score was associated with corrective action ($P < 0.001$).	N/A	It will be harder to predict a candidates' risk for needing corrective action during training without numerical Step 1 scores.
Patel et al. 2020 ⁵⁶	Radiology	387 radiology residents	N/A	N/A	Residents were stratified into three tiers of USMLE scores. Tier stratification was significantly associated with American Board of Radiology Core examination performance for both Step 1 and Step 2.	Even without scores Step 1 scores, Step 2 can be used to predict the American Board of Radiology Core examination pass rate.
Pontell et al. 2021 ⁹⁵	Various surgical	497 PDs	78.1% disagreed	The majority of PDs agreed it will be more difficult to objectively compare applicants (88.3%) and more arduous (85.4%). 52.7% agreed IMGs will be disadvantaged. Most were neutral about whether it will decrease medical students' basic science knowledge (45.8%).	Only 6.2% agreed it will decrease socioeconomic disparity in the application process, and only 19.6% agreed it will improve medical student well-being.	88.7% agreed they will increase the emphasis on Step 2 CK scores, and 88.4% agreed they will begin requiring Step 2 CK. 63.5% will consider the candidate's medical school of increased importance. Only 21.3% said they will require a supplemental application.

(continued)

Table 3 – (continued)

Source	Specialty	Subjects	Majority opinion	Concerns	Support	Implications
Vinagre et al. 2020 ⁶³	Anesthesia	45 anesthesiology PDs	82% disagreed	N/A	N/A	The majority of PDs agreed recommendation letters will be most important (80%), followed by Step 2 CK (78%), and the MSPE (69%). respondents agreed that home students will have an advantage (69%). Research will also become more important after the change (moved from 17 th to 9 th position in PD ranking). The majority of PDs supported restricting applicants to apply to 15-20 programs (64%).
Wallach et al. 2020 ⁶⁴	Medicine	4012 internal medicine residents	55% disagreed	48% agreed that USMLE Step 1 accurately estimated knowledge.	N/A	N/A
Warren et al. 2021 ⁹⁹	None	2056 tweets by physicians and students	42% of physicians agreed. 40% of students were neutral.	Tweets most commonly referenced an increased focus on Step 2 CK, a need for standardized comparison tool, and the negative impact on IMG applicants.	Tweets most commonly referenced an emphasis on holistic application review, improved overall clinical knowledge without the stress of Step 1, and the avoidance of inappropriately using Step 1 as a screening metric.	N/A
Wei et al. 2020 ⁶⁶	Dermatology	37 dermatology PDs	42.9% disagreed	The majority (54%) agreed it will negatively affect applicants from lower ranked medical schools.	33% agreed underrepresented minority groups will benefit.	The majority of PDs agreed Step 2 CK scores will be required (65%) and that applicants will need additional extracurricular/extramural resources for interview consideration (43%).
Zhang et al. 2022 ⁷¹	Radiology	88 radiology PDs	N/A	N/A	N/A	PDs agreed that Step 2 CK scores are likely to be required (57%) or will definitely be required (36%). On a scale of 1-5, PDs will emphasize class ranking (4.36), USMLE Step 2 CK score (4.27), clerkship grades (4.22), and MSPE/Dean's letter (4.11)

ENT = Otolaryngology; LOR = Letters of Recommendation.

Table 4 – Quantitative data on the opinions surrounding the new Step 1 format.

Article	Specialty	Population	Majority opinion	Sample size (N)	%
Wallach et al. ⁶⁴	Internal medicine	Residents	Disagreed	4012	55%
Makhoul et al. ⁵⁰	Various	PD	Disagreed	2095	61%
Lewis et al. ²⁶		Medical students	Disagreed	732	60%
Pontell et al. ⁹⁵	Surgical	PD	Disagreed	495	78%
Goshtasbi et al. ⁹⁰	ENT	Faculty	Disagreed	257	68%
Ehrlich et al. ^{40,87}		Medical students	Disagreed	215	54%
Choudhary et al. ³⁷	Internal medicine	PD	Disagreed	206	73%
Lin et al. ^{6,23}	Plastic surgery	Residency applicants	Disagreed	164	60%
MacKinnon ⁴⁹	Radiology	PD	Disagreed	140	70%
Cohn et al. ³⁸	Orthopedic	PD	Disagreed	78	83%
Huq et al. ⁴⁵	Neurosurgery	PD, APD	Disagreed	75	79%
Erath et al. ⁴¹	Anesthesiology	PD	Disagreed	72	74%
Chisholm and Drolet ³⁶	Urology	PD	Disagreed	65	59%
Lin et al. ^{6,23}	Plastic surgery	PD	Disagreed	64	81%
Ganesh Kumar et al. ^{42,114}	Neurosurgery	PD	Disagreed	48	79%
Vinagre et al. ⁶³	Anesthesiology	PD	Disagreed	45	82%
Chator et al. ⁸⁵	PM&R	PD	Disagreed	39	51%
Wei et al. ⁶⁶	Dermatology	PD	Disagreed	37	43%
Asaad et al. ⁵	Plastic surgery	PD	Disagreed	18	83%
Carmody et al. ^{1,2,14,33,74}		Medical students	Agreed	2856	55%

APD = Assistant Program Director; ENT = Otolaryngology.

dermatology,^{50,66} emergency medicine,⁵⁰ internal medicine,^{37,50,64} PM&R,^{50,85} radiology,^{49,50} family medicine,⁵⁰ genetics,⁵⁰ neurology,⁵⁰ nuclear medicine,⁵⁰ obstetrics and gynecology,⁵⁰ ophthalmology,⁵⁰ osteopathic neuromusculoskeletal medicine,⁵⁰ pathology,⁵⁰ pediatrics,⁵⁰ preventative medicine,⁵⁰ psychiatry,⁵⁰ and radiation oncology were also sampled.⁵⁰ Overall, opinions on the new format reflect those found in a broad number of specialties.

The opinions of medical faculty, residents, and students were all represented in the articles included. Although articles that assessed the opinions of medical students were fewer than those that assessed those of medical faculty, the majority held opinion regarding the new Step 1 format was consistent throughout the medical community as a whole. Articles included in this study showed that the majority of surveyed individuals disagreed with the decision to change the Step 1 format, with the exception of one article by Carmody et al. who surveyed 2856 medical students and found that 55% agreed with the change.

Key arguments

Several common arguments were made throughout the literature both in support of and against the Step 1 pass/fail format. These arguments centered around the role of Step 1 as a medical knowledge assessment tool and predictor of future board scores, the role of Step 1 specific knowledge in medical school education, the effect of numerical scores on mental

well-being and diversity in medicine, as well as the role of numerical scores in residency application screening.

Do step 1 scores reflect medical knowledge and predict future resident performance or prematurely eliminate qualified candidates?

Although Step 1 was designed to assess medical knowledge, its primary intent was not to predict a candidate's future performance as a resident.^{1-4,11,53,59,72,99,100} Literature in support of forgoing a numerical scoring format argued that relying on Step 1 scores to predict a candidate's capabilities as a physician can prematurely eliminate qualified applicants.^{11,47,53,57,75,83,86} Busha et al. compared resident performance on USMLE and ACGME assessments, finding no correlation.⁸³ However, Maxfield and Grim showed a significant correlation between poor Step 1 performance and the need for corrective action during training.⁵² Those who support numerical Step 1 scoring argue for its reliability in predicting future board performance.^{20,45,54,76,83,96,101-107} Markham et al. showed that Step 1 scores better predicted anesthesiology board performance when compared with Step 2 CK scores.⁵¹ Patel et al. however, showed that in the absence of Step 1 scores, Step 2 CK could be used to predict radiology board scores.⁵⁶ Although numeric Step 1 scores seem to be reliable predictors of board scores, they are not designed to comprehensively assess the ACGME competency domains, which comprise a successful trainee.

Do step 1 scores motivate learners or create a test-centered education?

In their decision to change the Step 1 format, the NBME and Federation of State Medical Boards (FSMB) called attention to a “parallel curriculum” propagated by the pressure to achieve a high numeric Step 1 score.³ Students perceived studying for their institutional curriculum *versus* Step 1 as two conflicting obligations, usually choosing to focus their attention toward Step 1.^{3,33} Of 2856 students surveyed by Carmody et al., 64% said they were less engaged with non-Step 1 material.³³ Several articles suggested that binary Step 1 scoring would promote student engagement with their institutional curriculum and yield more time to devote toward patient care.^{33,75,82,84} Some articles raised the concern that students would lack motivation to study without the pressure of numerical Step 1 scores.^{46,76} Of 732 medical students surveyed by Lewis et al., those who disagreed with the new format were more likely to agree students’ knowledge would decrease.²⁶ Some surveys showed the majority of PDs agreed,^{37,41,42,49} whereas others showed a majority were neutral.^{36,50,85,95} Although Step 1 specific knowledge may decrease without the incentive of numerical scoring, students will have the opportunity for holistic learning by fully engaging in their institutional curriculum.

Will student well-being improve with pass/fail scoring or will anxiety be displaced onto step 2?

The NBME and FSMB sought to increase student well-being via their decision.⁴ It has been argued that the pressure of a numerical Step 1 score determining students’ specialty, residency location, and self-worth pushes students to their physical and psychological limits.^{23,75} Advocates for student well-being believe stress and anxiety will decrease with binary Step 1 scores.^{1,2,11,34,49,55,57,75,77,82,84,86} Lin et al. showed most integrated plastic surgery applicants agreed it would improve student well-being.⁶ Several studies, however, showed that most PDs surveyed disagreed.^{6,36,37,41,42,49,50,85,90,95} Goshtasbi et al. surveyed otolaryngology, showing most agreed that anxiety surrounding interviews would increase (59.1%).⁹⁰ Other articles suggested stress surrounding Step 2 CK’s importance may increase.^{53,62} Students’ stress may be displaced onto new metrics that will gain importance in the residency selection process in the absence of numerical Step 1 scores.

Will diversity in medicine diminish if applicants are unable to stand out via scores or will the pass/fail format level the playing field?

Another important factor in the NBME and FSMB’s decision was a concern that numerical Step 1 scores diminish diversity in medicine.²² It was proposed that binary scoring could benefit students who are underrepresented in medicine (URiM) and those of low socioeconomic backgrounds. Because those who are URiM have historically scored lower on Step 1, proponents of binary scoring argue that the new format will lead to increased representation of those who are URiM.^{1,2,11,49,53,55,57,67,70,77,79,82,84,87,91,94,108,109} Most PDs

surveyed about this issue did not agree URiM individuals would benefit from the change.^{66,90} Those against binary scoring argue that URiM individuals will be unable to use a high Step 1 score to stand out.^{53,79} Proponents of binary scoring argued that the financial cost of Step 1 preparation materials hinders students from low socioeconomic backgrounds from achieving high Step 1 scores.^{1,2,11,45,55,72,75} Several survey studies showed a majority of PDs and applicants disagreed that the score change would improve socioeconomic inequities.^{6,36,37,41,42,49,50,85,95} Less affluent students may still be disadvantaged if PDs rely more on bias-prone heuristics, including medical school reputation, additional degrees, or research years.^{50,98} Nevertheless, these two groups of applicants have the potential to gain the most from the new format change compared with others.

Will international and osteopathic applicants be disadvantaged or maintain the same opportunities without numeric step 1 scores?

In contrast, international medical graduates (IMGs) and osteopathic graduates may experience greater challenges in the residency application process because of binary scoring.^{28-30,46,59,76,78,84,96} Several survey studies showed that most PD participants believed IMGs would be disadvantaged.^{36,37,41,42,49,50,90,95} However, there were two survey studies that showed only a minority agreed with this concern.^{45,85} IMGs depend on the standardized comparison of Step 1 scores for consideration, often lacking a Medical Student Performance Evaluation (MSPE), letters of recommendation from US physicians, and rotation opportunities.^{28-30,46,76,78,96} Most otolaryngology faculty surveyed by Goshtasbi et al. believed osteopathic graduates would be disadvantaged.⁹⁰ Osteopathic students were also more likely than allopathic students to perceive binary scoring as a disadvantage.^{40,87} However, only 22% of plastic surgery PDs surveyed by Asaad et al. believed it would impact osteopathic applicants more than allopathic.⁵ Although the full effects of the score change on IMGs and osteopathic graduates is still uncertain, it is expected that additional means will be necessary for these applicants to stand out in the application process.⁹²

Will residency programs be unable to objectively compare applicants or use other holistic means of comparison?

Although the new format will prevent the use of Step 1 as a screening metric, overapplication that prompted its use in this manner has yet to be addressed.^{2,57,77} Several survey studies showed most PDs are concerned it will be harder to objectively compare applicants and will become more arduous overall.^{6,36,37,41,42,49,50,85,95} Competitive specialties expect to see an increase in application numbers once the new format takes effect.^{6,45} New metrics and limitations on applications have been suggested to more efficiently and holistically evaluate candidates.^{2,43,47,57,61,63,77,82,88,93,94}

Implications

Residency programs may place a stronger emphasis on other aspects of a candidate’s application once binary scoring of

Step 1 takes effect. Several survey studies across specialties showed most PDs plan to increase the emphasis on Step 2 CK and will likely use it as a substitute for Step 1.^{5,6,36-38,41,42,45,49,50,63,71,81,85,90,95} Familiarity with the department either through a home or away rotation will be important,^{5,38,63,90} along with letters of recommendation,^{5,38,63,90} and the MSPE, especially components of academic history and professionalism.^{38,63,71,81,90} Medical school reputation may benefit top-tier graduates and/or disadvantage low-tier graduates based on survey predictions of dermatology⁶⁶ and neurosurgery PDs.⁴⁵ The majority of PDs surveyed agreed school reputation will be important,^{6,36,37,41,42,49,50,85,90,95} as well as research and dedicated research time.^{6,45,63,66}

Discussion

A total of 81 articles were identified, which discussed the opinions on and implications of the new Step 1 pass/fail scoring format. Concerns were raised that Step 2 CK would be used as a substitute and that resident diversity would decrease. The literature suggests there are strong opinions both in support of and against the change throughout the medical community. Step 2 CK scores, medical school reputation, applicant familiarity, Dean's letters, recommendation letters, and research will likely become more important.

The decision to change the Step 1 format to pass/fail was based on various factors according to the NBME and FSMB, including a goal to improve student well-being and increase diversity within various specialties.^{3,4,22} Although the new format of Step 1 eliminates numerical scoring, Step 2 CK numerical scoring is maintained and will likely be used by programs as the substitute screening tool. The stress associated with a numerical board examination determining a candidate's future career may be displaced onto Step 2 CK as long as it is emphasized by residency programs.⁶² In addition, URiM individuals, those of low socioeconomic status, IMGs, and osteopathic graduates may face new challenges matching into various specialties.^{23,49,92} Unless a holistic approach to application review is taken, diversity in medicine may decrease while stress is maintained.

Although Step 1 has served as an objective comparison tool for many years, this new change provides an opportunity to create a more holistic evaluation process.^{72,74,86,91} Odei *et al.* proposed seven parameters for applicant screening: (1) research scholarship; (2) academic achievements; (3) demonstrated compassion; (4) commitment to the field; (5) diversity of perspective, background, and life experiences; (6) interpersonal skills; and (7) demonstrated leadership.⁹⁴ To better communicate these aspects, MSPEs can be reformatted to focus on competencies and provide a succinct and transparent summary of a candidate's fitness for residency.^{23,47,94} Standardized letters of recommendation can be used to assess cumulative knowledge and skills specific to each field.⁴⁷ Programs that implemented holistic review have observed an increase in the diversity of residents selected for an interview.^{74,86,110-113}

The holistic consideration of each candidate will require time, which already overloaded residency programs may not have available. After all, the use of Step 1 as a screening tool

was at least in part propagated by the large number of applications that each program must sort through.^{1,2,20} With the new format, competitive specialties expect a further rise in applications.^{6,45} Lin *et al.* suggested several solutions including limiting the number of applications candidates can submit, offering an early match process, or using graduated application process, which limits the initial application number but allows additional submissions after a month.²³ Although this will limit the number of opportunities candidates have to gain interviews, in exchange they will have the opportunity to be carefully considered by each program they apply to.²³

Our review has a number of limitations. Only 27 articles (33.3%) presented quantitative findings, many of which are survey studies and subject to selection bias. Articles that were included precede the format change, thus opinions may change once the new format takes effect; however, because the discussion surrounding the topic began as early as 2011 in the literature, we believe opinions on the matter have been adequately conveyed in this review. Nevertheless, new findings continue to emerge because our search, which suggests viewpoints of the younger generations in medicine, may soon outweigh the current majority. For instance, in a recent publication by Kumar *et al.*, which was beyond the timeframe of our search criteria, it was found that current medical students favored the score change more than residents and fellows and that current trainees who are underrepresented minorities favor the change, contrasting our findings.¹¹⁴ It is also important to consider that published literature may represent a subset of the medical community with strong opinions about the change and not the medical community as a whole.

Conclusion

The change from numerical Step 1 scoring to pass/fail has fundamentally reshaped the residency application process. Rather than using Step 2 CK as the substitute for Step 1, an emphasis should be placed on restructuring the residency selection process to evaluate candidates holistically.

Author Contributions

L.N.R. and J.E.J. contributed to conceptualization and methodology. L.N.R. contributed to data curation, formal analysis, and writing the original article. J.E.J. contributed to project administration, resources, supervision, and reviewing and editing the article.

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