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Timing of USMLE Step 2 CK and First-Attempt Performance at a Caribbean Medical School: A 15-Year Retrospective Study

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Abstract

Background

Many offshore medical schools offer multiple entry points to matriculate annually, resulting in variability in the timing of USMLE examinations. Although the optimal timing of Step 2 CK in relation to the residency application cycle remains unclear, students may frequently expedite testing to ensure that scores are available for residency applications.

Objective

To determine whether testing period (before vs. on or after August 1) is associated with differences in first-attempt pass rates and scores on the USMLE Step 2 CK.

Methods

All first-attempt USMLE Step 2 CK examinations from January 1, 2011 through December 31, 2025, were analyzed (N = 919). No cases were knowingly excluded. Scores were evaluated relative to the passing standard in effect at the time of each examination. Additionally, scores were not scaled for the time period in which they were taken because the USMLE does not provide scaling.

Results

The overall pass rate was 78.9% (725/919). Nearly half of first attempts (49.0%) occurred in July, August, and September. The first-attempt pass rate was lower for examinations taken on or after August 1 than before August 1 (75.2% vs. 82.5%; absolute difference 7.3 percentage points, 95% CI 2.01–12.53; OR 1.55, 95% CI 1.13–2.14; p = .007). Mean Step 2 CK scores were also lower on or after August 1 (mean 223, 95% CI 221–225) than before August 1 (mean 226, 95% CI 224–228; p = .005); the effect size was small (Cohen's d = 0.14).

Conclusions

At a Caribbean medical school with three annual start dates, nearly half of first-attempt Step 2 CK examinations occurred between July and September. Testing on or after August 1 was associated with a lower first-attempt pass rate and lower mean Step 2 CK score. Given the observational design and absence of individual-level covariates, these findings represent associations and should not be interpreted as causal.

Introduction

The United States Medical Licensing Examination (USMLE) Step 1 and Step 2 Clinical Knowledge (CK) are high-stakes assessments required for medical licensure and play a significant role in residency selection. Extensive research has examined factors associated with USMLE performance, including prior academic achievement, demographic characteristics, medical school type, and preparation strategies.[1] [2] Studies consistently demonstrate that prematriculation variables, particularly MCAT scores and undergraduate GPA, are the strongest predictors of Step 1 and Step 2 CK performance, with one cross-sectional study of 89 U.S. allopathic medical schools finding that these variables accounted for up to 72% of the variance in institutional-level (not individual-level) Step 1 scores.[2] However, despite nearly three decades of research on USMLE performance, less is known about how examination outcomes vary according to testing period.[3]

Limited evidence suggests that the timing of examination may influence USMLE outcomes. Pohl and colleagues (2004) reported that Step 2 CK scores declined significantly over the fourth year of medical school, with early testers scoring approximately 4 points higher than predicted and late testers scoring 5–8 points lower than predicted.[4] Studies examining the scheduling of Step 1 after core clerkships have demonstrated modest but significant increases in scores and reduced failure rates, suggesting that the timing of examinations relative to clinical experience impacts performance.[5][6] Furthermore, for Step 1 preparation specifically, the length of the dedicated study period correlates with pass rates: students with six or more weeks of protected preparation time achieve a 96% pass rate, compared to 87% for those without dedicated time.[1] Study behaviors during the dedicated period are also associated with performance; students who begin studying before the official dedicated period and complete more practice questions achieve higher scores.[7] Whether these findings extend to Step 2 CK preparation is less well established; at least one study found no significant benefit of a dedicated study month for Step 2 CK after controlling for Step 1 scores.[8] These findings prompt further investigation into whether broader temporal patterns, such as seasonal variations, may affect pass rates among the national examinee population.

Despite prior research on examination timing and USMLE scores, little is known about whether first-attempt Step 2 CK pass rates vary across the calendar year. The structure of Caribbean medical schools, many of which offer multiple annual start dates, results in cohorts reaching clinical milestones at different times. Consequently, students within the same institution may reach Step 2 CK at different points in the calendar year, providing an opportunity to examine whether the calendar month of testing is associated with examination outcomes. The 2022 transition to pass/fail scoring for Step 1 has further increased the significance of Step 2 CK as a primary standardized metric in residency selection (Romer et al., Academic Medicine, 2025; Cangialosi et al., Academic Medicine, 2021).[9][10] This study aims to determine whether the month in which Step 2 CK is taken is associated with pass rates and scores at a Caribbean medical school with three annual start dates.

Methods

Ethics Approval

This study was approved by the Trinity School of Medicine Institutional Review Board (IRB approval no. 022024-008).

Study Design and Setting

This was a retrospective analysis of all first-attempt USMLE Step 2 CK examinations at a single Caribbean medical school with three annual start dates (January, May, and September). Students complete preclinical coursework on the island campus before transitioning to clinical rotations at affiliated hospitals in the United States. Data on Step2 were analyzed by testing date, not score report date. The first attempt pass rates were examined by calendar month. An additional exploratory analysis compared examinations taken from January through July with those taken from August through December. The August 1 cutoff reflected both an hypothesis concerning residency-application activities and inspection of the observed monthly outcomes; therefore, this comparison was considered exploratory rather than confirmatory. This study was designed and reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.

Study Population

All first-attempt Step 2 CK examinations from January 1, 2011, through December 31, 2025, were included (N = 919). A first-attempt was defined as an examinee testing for the first time; repeat attempts were excluded.

Data Collection

Step 2 CK scores and pass/fail outcomes were obtained from institutional records. Scores were compared to the contemporaneous passing standard in effect at the time each examination was taken. Scores were not scaled across the study period because the USMLE does not provide scaling data because scores are said to be comparable across forms and years

Statistical Analysis

Examinees were grouped into two testing periods based on an August 1 cutoff: before August 1 (January through July) and on or after August 1 (August through December). August 1 was selected as the cutoff because it marks the period when Step 2 CK preparation increasingly overlaps with residency application preparation and because pass rates appeared to differ around this point in the calendar year. As a sensitivity analysis, month-by-month pass rates were also examined (Table 5, Figures 4–5) because the binary cutoff can obscure within-period heterogeneity.

Pearson's chi-square test was used to evaluate the association between testing period and first-attempt pass/fail outcome. Fisher's exact test, the continuity-corrected chi-square test, and the likelihood ratio test were also computed to confirm robustness. An independent-samples t-test compared mean Step 2 CK scores between the two periods. Statistical significance was set at $p < .05$. Effect sizes were

calculated using the odds ratio (with 95% CI) for the pass/fail comparison and Cohen's d for the score comparison.

Results

Study Population

Nine hundred nineteen first-attempt Step 2 CK examinations from January 1, 2011, through December 31, 2025, were analyzed. The overall pass rate for the study period was 78.9% (725/919).

Testing Volume by Month

Testing volume varied substantially across the calendar year. The three highest-volume months were August (n = 181, 19.7%), July (n = 139, 15.1%), and September (n = 130, 14.1%). Together, these three months accounted for 49.0% (450/919) of all first-attempt attempts. The lowest-volume months were January (n = 25, 2.7%) and February (n = 33, 3.6%), followed by October and November (each n = 46, 5.0%). The distribution of first-attempt attempts by month is presented in Table 1 and Figure 1.

Table 1. Distribution of First-Attempt Step 2 CK Attempts by Month (N = 919)

Month	n	% of Total
January	25	2.7
February	33	3.6
March	64	7.0
April	55	6.0
May	61	6.6
June	86	9.4
July	139	15.1
August	181	19.7
September	130	14.1
October	46	5.0
November	46	5.0
December	53	5.8

Note: Percentages are rounded to one decimal place and may not sum to 100.0% due to rounding.

Pass Rates by Testing Period

Using all 12 months, Pearson $\chi^2(11) = 13.44$; $p = .265$. Those testing before August 1 (January through July; n = 463) had a significantly higher pass rate than those testing on or after August 1 (August through December; n = 456): 82.5% versus 75.2% (p = .007). The failure rate was 17.5% (81/463) before August 1 and 24.8% (113/456) on or after August 1. The odds of failure were higher for examinees testing on or after August 1 (odds ratio 1.55; 95% CI, 1.13–2.14). Pass/fail outcomes by testing period are presented in Table 2 and Figure 2.

Table 2. Pass/Fail Outcomes by Testing Period (N = 919)

Testing Period	Pass, n (%)	Fail, n (%)	Total
Before August 1	382 (82.5%)	81 (17.5%)	463
On or After August 1	343 (75.2%)	113 (24.8%)	456
Total	**725 (78.9%)**	**194 (21.1%)**	**919**

p = 0.007 by Pearson chi-square test.

Table 3. Chi-Square Tests of Association

Test	χ^2	df	p value
Pearson Chi-Square	7.32	1	0.007
Continuity Correction	6.89	1	0.009
Likelihood Ratio	7.35	1	0.007
Fisher's Exact Test	—	—	0.008
Linear-by-Linear Association	7.32	1	0.007

Note. N = 919. No cells had expected counts less than 5. The minimum expected count was 96.26.

The chi-square test confirmed a statistically significant association between testing period and pass/fail outcome. Results are presented in Table 3.

Step 2 CK Scores by Testing Period

Mean Step 2 CK scores were significantly lower among examinees testing on or after August 1 (mean = 223; 95% CI, 221–225) compared with those testing before August 1 (mean = 226; 95% CI, 224–228; p = .005). Although statistically significant and directionally consistent with the pass-rate findings, the difference of approximately 3 points was small. Score data are presented in Table 4 and Figure 3.

Table 4. Mean Step 2 CK Scores by Testing Period (N = 919)

Testing Period	N	Mean Score	95% CI	P value
Before August 1	463	226	224-228	
On or After August 1	456	223	221-225	.034

Note: CI = confidence interval. p-value from an independent-samples t-test. Cohen's d = 0.14.

Monthly Pass Rate (Sensitivity Analysis)

Pass rates varied by month around the overall study rate of 78.9%. Rates were generally higher during the lower-volume months earlier in the year and declined for examinees testing later in the year, consistent with the before/after August 1 comparison. Because several months have small denominators (e.g., January, n = 25), month-to-month estimates are unstable and should be interpreted with caution. Month-by-month outcomes are presented in Table 5 and Figures 4–5.

Table 5. Month-by-Month Pass/Fail Outcomes for Step 2 CK First-Attempts (N = 919)

Month	Pass, n (%)	Fail, n (%)	Total
January	21 (84.0%)	4 (16.0%)	25
February	28 (84.8%)	5 (15.2%)	33
March	53 (82.8%)	11 (17.2%)	64
April	45 (81.8%)	10 (18.2%)	55
May	45 (73.8%)	16 (26.2%)	61
June	70 (81.4%)	16 (18.6%)	86
July	120 (86.3%)	19 (13.7%)	139
August	131 (72.4%)	50 (27.6%)	181
September	100 (76.9%)	30 (23.1%)	130
October	35 (76.1%)	11 (23.9%)	46
November	37 (80.4%)	9 (19.6%)	46
December	40 (75.5%)	13 (24.5%)	53

Discussion

Among first-attempt Step 2 CK examinees at a Caribbean medical school with three annual start dates, testing on or after August 1 was associated with a significantly lower pass rate (75.2% vs. 82.5%, p = .007) and a lower mean score (223 vs. 226, p = .005) compared to testing before August 1. Nearly half of all first-attempts (49.0%) occurred between July and September, a period that aligns with residency application preparation.

Comparison with Existing Literature

These findings are consistent with the only prior study to examine the relationship between test administration date and Step 2 CK performance. Pohl and colleagues (2004) found that among 846 U.S. medical students, Step 2 CK scores decreased significantly across the fourth year, with early testers outperforming predictions by approximately 4 points and late testers underperforming by 5–8 points.[4] The present study extends this observation to a Caribbean medical school population and uses a pass/fail outcome rather than score deviation from predicted performance. Additionally, Jurich et al. (2019) demonstrated that administering Step 1 after core clerkships was associated with changes in examination performance, supporting the broader hypothesis that the timing of licensing examinations relative to clinical experience affects outcomes.[5]

The overall pass rate of 78.9% in this cohort is consistent with published data on Caribbean medical school USMLE performance. Van Zanten and Boulet reported that first-attempt Step 2 CK pass rates among Caribbean-educated examinees varied substantially by institution, with the present institution's pass rate falling at the upper end of the reported range.[11][12] Cuddy et al., in a multilevel analysis of 54,487 examinees, demonstrated that both examinee-level and school-level characteristics significantly influence Step 2 CK performance, highlighting the importance of accounting for individual-level variables — a limitation of the present study.[13]

Possible Explanations

Several factors may explain the lower pass rates and scores observed after August 1. The concentration of testing in July through September likely reflects pressure to complete Step 2 CK before the ERAS application cycle. With Step 1 now scored pass/fail, Step 2 CK has become a primary standardized metric in residency selection. Students testing in August and September may feel compelled to have a score available when applications are reviewed, potentially shortening their preparation time.

The three-start-date structure creates cohorts reaching clinical milestones at different points in the calendar year. Students from later-starting cohorts who test in August through December may have had less total clinical experience or less time between completing clerkships and sitting for Step 2 CK. Research has shown that the timing of USMLE examinations relative to clinical experience affects performance.[5][6]

Dedicated study period availability may also differ by testing month. In the Step 1 literature, pass rates increase from 87% with no dedicated time to 96% with six or more weeks of dedicated time.[1] However,

the applicability of these findings to Step 2 CK preparation is uncertain; Compton et al. found no significant benefit of a dedicated study month for Step 2 CK after controlling for Step 1 scores.[8] Students who test later in the year may have shorter or more fragmented preparation as Step 2 CK study overlaps with clinical responsibilities and residency application activities.

Research has also shown that most medical students experience worsening quality of life (72%), burnout (77%), and anxiety (81%) during dedicated preparation periods, though these data were derived from Step 1 and COMLEX Level 1 preparation and may not directly generalize to Step 2 CK.[14] The pressure of the ERAS timeline, combined with the stress of dedicated preparation, may be particularly acute for students testing in August and September.

For students who fail Step 2 CK on their first attempt, the stakes are high. Rubright et al. (2022) found that repeaters display consistently lower pass rates on subsequent attempts, with the majority of those who eventually pass doing so by their second or third attempt; nearly all who will pass have done so by the fourth attempt, which informed the reduction of the attempt limit from six to four.[15] Students who initially failed Step 1 had lower Step 2 CK pass rates and were less likely to match into residency.[16] These findings underscore the importance of adequate preparation before the first attempt rather than rushing to test within a particular window.

Educational and Institutional Implications

These findings do not establish that moving Step 2 CK examinations to an earlier calendar month improves performance. Examination scheduling should continue to prioritize demonstrated readiness and completion of required clinical preparation. Institutions may use the observed pattern to investigate whether students approaching residency-application deadlines encounter preparation constraints or pressures to test before they are ready.

Limitations

This study has several limitations. It represents a single Caribbean medical school, and results may not generalize to other institutions or to U.S. medical schools. Cuddy et al. (2006) demonstrated that both school-level and examinee-level characteristics significantly influence Step 2 CK performance in a multilevel analysis, underscoring the limitation of single-institution data.[13] Scores were not scaled to the time period in which they were taken because the USMLE does not provide scaling data, which could introduce confounding if passing standards change over the 15-year study period. The study analyzed only first-time attempts and did not examine retake performance. Individual-level variables, including prior academic performance, examination readiness, dedicated study duration, and preparation strategies, were unavailable for analysis. These variables are known to be strong predictors of USMLE performance and could confound the observed association between testing month and outcomes.[1][3] Recent research has also identified disparities in Step 2 CK performance by disability status and race/ethnicity, representing additional unmeasured confounders in the present study. The study cannot determine whether the lower pass rates after August 1 reflect a calendar effect, differences in examination readiness among later testers, curriculum timing, or pressure to complete Step 2 CK for

residency applications. Finally, data on which cohort start date (January, May, or September) each student belonged to were not available, which could help clarify whether the observed patterns reflect curriculum timing rather than calendar season. While the pass rate difference was statistically significant, Cohen's d of 0.14 for the score comparison indicates a small effect size, and the clinical meaningfulness of a 3-point score difference should be interpreted cautiously.

Future Directions

Future research should examine whether these patterns are replicated at other Caribbean medical schools and at U.S. institutions. Studies incorporating individual-level covariates would help determine whether the association between testing month and performance is independent of student-level factors. Month-by-month pass rate analyses, rather than the binary August 1 cutoff used here, could reveal whether specific months drive the observed effect.

Conclusions

At a Caribbean medical school with three annual start dates, nearly half of first-attempt Step 2 CK examinations occurred between July and September. Testing on or after August 1 was associated with a lower first-attempt pass rate (75.2% vs. 82.5%, $p = .007$) and a lower mean Step 2 CK score (223 vs. 226, $p = .005$). These results indicate that the timing of Step 2 CK may influence outcomes and should be considered in student advising and institutional planning, particularly at institutions with multiple start dates where students reach testing milestones at different times of the year.

Declarations

Ethics approval and consent to participate

This study was approved by the Trinity School of Medicine Institutional Review Board (IRB approval no. 022024-008). Because this was a retrospective analysis of existing, de-identified institutional records, the Institutional Review Board waived the requirement for individual informed consent. All methods were carried out in accordance with relevant guidelines and regulations and with the principles of the Declaration of Helsinki.

Consent for publication

Not applicable. This manuscript reports only aggregate, de-identified data and contains no individual-level identifiable information, images, or case details.

Availability of data and materials

The datasets generated and analyzed during the current study are not publicly available because they contain confidential student examination records but are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

Conceptualization, J.G. and K.M.; methodology, H.P.; formal analysis, H.P.; investigation, J.G. and K.M.; resources, J.G. and K.M.; data curation, H.P.; writing—original draft preparation, H.P.; writing—review and editing, H.P., J.N., K.M. and J.G.; visualization, H.P. All authors read and approved the final manuscript and agree to be accountable for all aspects of the work.

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Figures

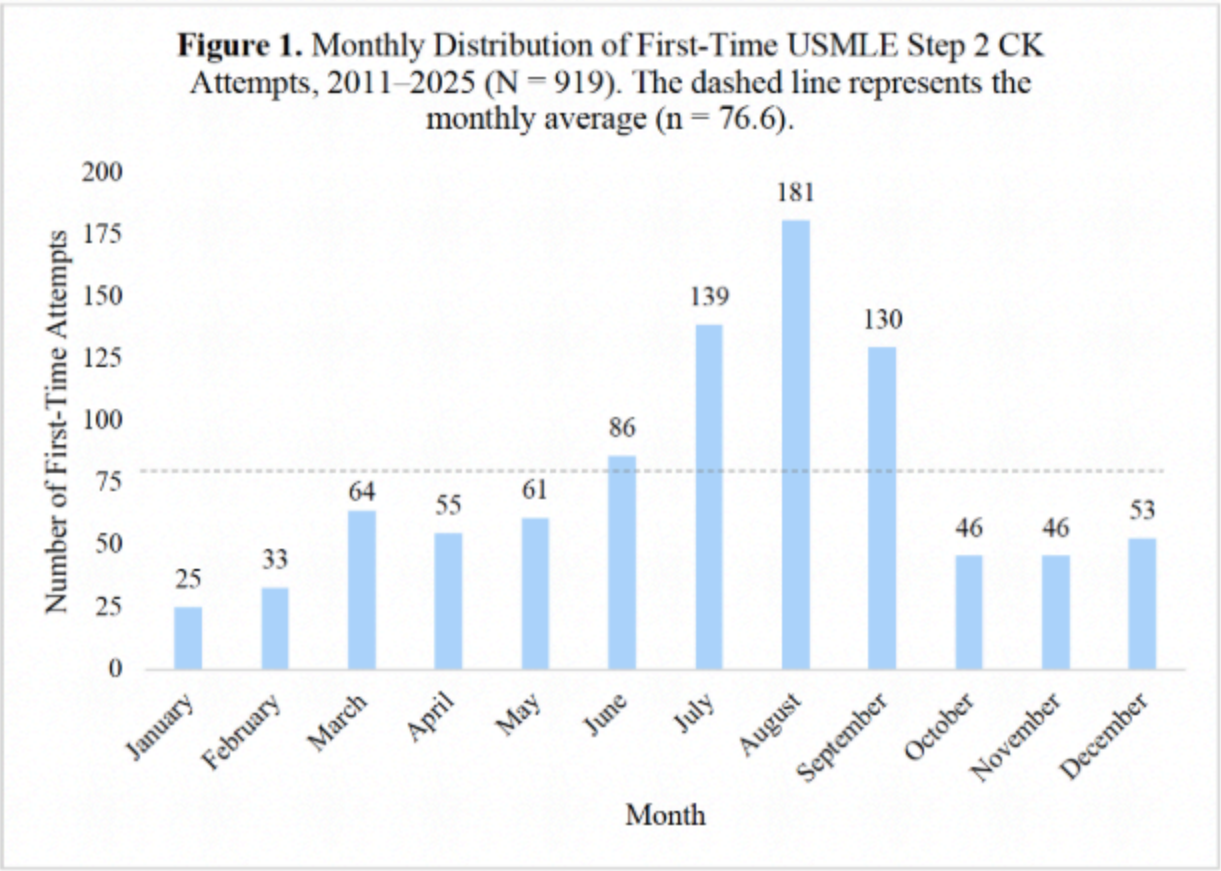


Figure 1

Monthly distribution of first-attempt Step 2 CK attempts, 2011–2025 (N = 919). Bar chart showing the number of first- attempts for each calendar month; the dashed line represents the monthly average (n = 76.6). The three highest-volume months (July, August, September) are highlighted and together account for 49.0% of all attempts.

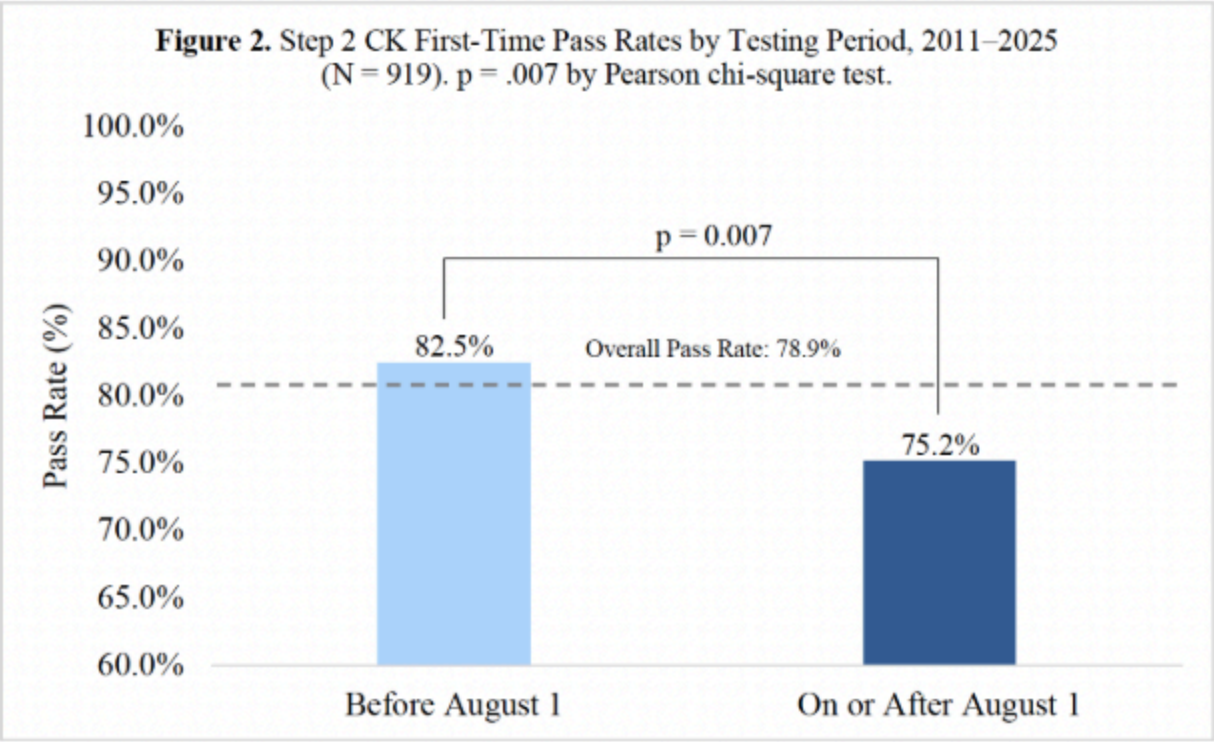


Figure 2

First-attempt Step 2 CK pass rates by testing period, 2011–2025 (N = 919). Bar chart comparing pass rates before August 1 (82.5%) and on or after August 1 (75.2%). The horizontal dashed line indicates the overall pass rate (78.9%); the bracket denotes p = .007 by Pearson chi-square test. The chi-square test indicated a statistically significant association between testing period and pass/fail outcome. Detailed test statistics are presented in Table 3.

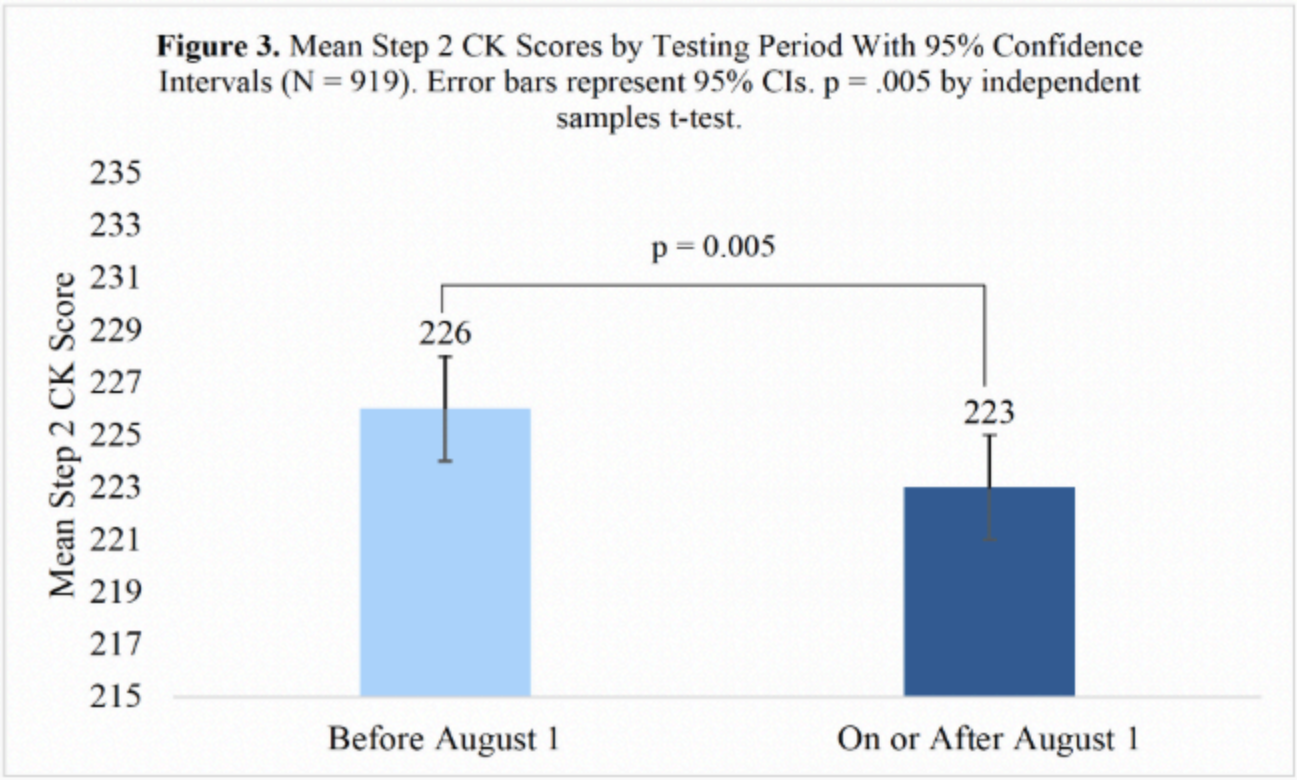


Figure 3

Mean first-attempt Step 2 CK scores by testing period (N = 919). Bar chart comparing mean scores before August 1 (226) and on or after August 1 (223). Error bars represent 95% confidence intervals; the bracket denotes p = .005 by independent-samples t-test. Note: the y-axis is truncated; the between-group difference is small (Cohen's d = 0.14).

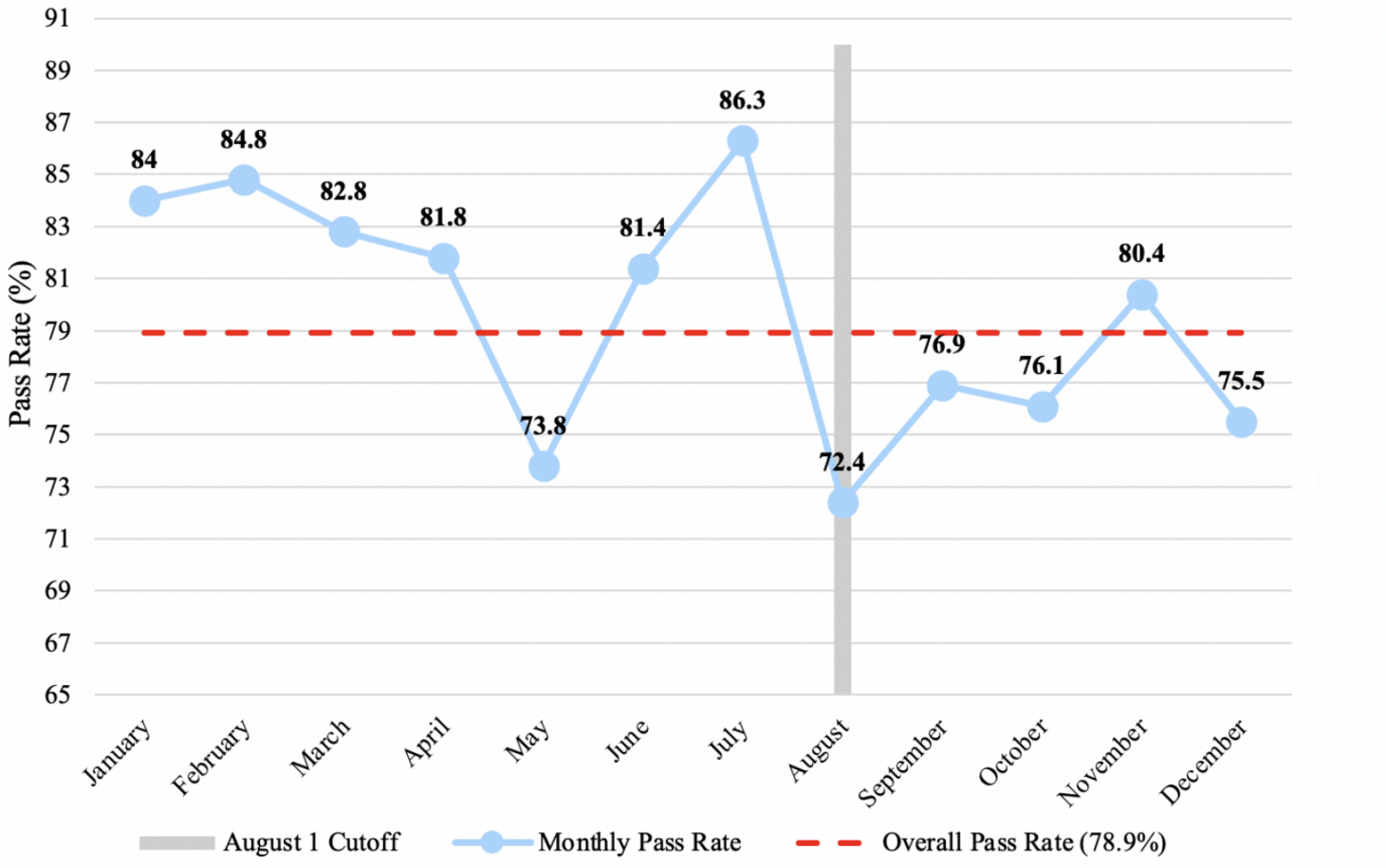


Figure 4

First-attempt Step 2 CK pass rate by month (N = 919). The red dashed line indicates the overall pass rate (78.9%); the shaded bar marks the August 1 cutoff.

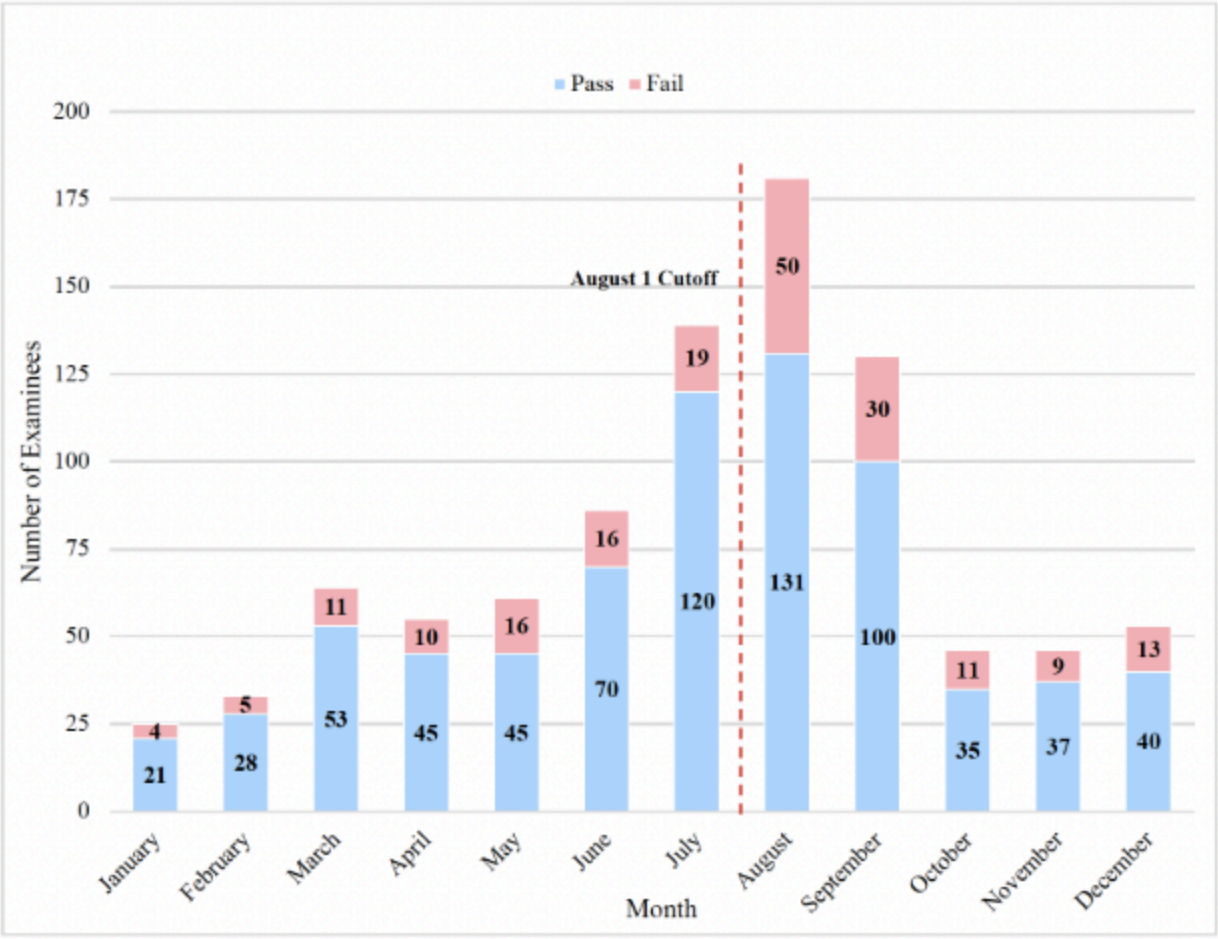


Figure 5

First-attempt Step 2 CK outcomes by month: pass and fail counts (N = 919). The dashed line indicates the August 1 cutoff; bar height represents total attempts per month.