Advances in Medical Education and Practice

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ORIGINAL RESEARCH

The Adverse Impact of Delay Upon Successfully Completing the National Registry EMT Exam on the First Attempt

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Purpose: Emergency Medical Technicians (EMTs) provide lifesaving care to sick and injured patients. After completing a state-approved course with cognitive and psychomotor training, EMT certification requires passing the National Registry computer-based adaptive exam. This study examined whether delays in taking the exam are associated with failure and provides context on the EMT role and certification process in the United States.

Methodology: Data included pass/fail results from 714 students who completed EMT courses between January 2013 and June 2025 at a large public university in Los Angeles County, California. All courses used similar curricula, equipment, facilities, instructors, and competencies. The study analyzed first-attempt exam outcomes relative to the time elapsed between course completion and testing.

Findings: Students who tested within 15–45 days had comparable pass rates, with the highest success among those testing within 30 days. Passage rates declined significantly after 45 days, and delays beyond 60 days were strongly associated with failure. These results indicate that the best chance of passing occurs when the exam is taken within 1–45 days of course completion.

Originality: This study demonstrates that delaying the National Registry EMT exam increases the likelihood of failure, particularly after 60 days. The findings can guide administrators and instructors in advising students to minimize delays and may inform curriculum adjustments to support long-term knowledge retention.

Plain Language Summary:

What was the study about?

This study looked at how long students wait to take the National Registry EMT exam after finishing their training, and whether that delay affects their chances of passing.

Why does it matter?

EMTs play a critical role in emergency care. To become certified, they must pass a national exam after completing a state-approved course. Understanding what helps or hurts their chances of passing can improve training and support.

What did the researchers do?

They analyzed exam results from 714 students who completed EMT courses at a large public university in Los Angeles County between 2013 and 2025. All students had similar training and resources. The key variable was how many days passed between finishing the course and taking the exam.

What did they find?

- Students who took the exam within 15 to 45 days had similar—and generally good—pass rates.
- The best results were seen in students who tested within 30 days.
- Students who waited more than 45 days were less likely to pass.
- The risk of failing was especially high if the delay was over 60 days.

Received: 20 September 2025
Accepted: 13 December 2025
Published: 19 December 2025

Why is this important?

The longer students wait, the more likely they are to forget what they learned. These findings suggest that students should take the exam soon after finishing their course, ideally within 30 days. Schools might also consider adjusting their curriculum to help students retain knowledge longer.

Keywords: emergency medical technician, certification delay, cognitive assessment, exam timing, student performance, licensure outcomes, educational advising, psychomotor training

Introduction

The purpose of this study is to examine how the timing of the National Registry Emergency Medical Technician (EMT) exam after course completion influences first-attempt success. EMTs are frontline providers of emergency care, stabilizing patients, documenting interim treatment, and relaying critical information to hospital staff.[1,2]

The US trauma care system operates through five levels of centers, ranging from comprehensive regional hospitals (Level 1) to basic stabilization facilities (Level 5).[3–5] Effective EMS coordination remains critical, though variability in resources and protocols continues to challenge system performance.[6,7,]

EMT education is guided by national standards established by the National Highway Traffic Safety Administration (NHTSA), emphasizing cognitive knowledge, psychomotor skills, and lifelong learning.[8,9,] While curricula are broadly consistent, local variations exist, particularly in California where county policies shape practice.[10] Certification typically requires passage of the National Registry of EMTs (NREMT) exam, which remains the national benchmark even in states with independent certification systems.[11]

Studies highlight multiple factors influencing exam success, including instructor quality, standardized curricula, and preparatory courses.[12–14] Importantly, research across medicine and law shows that delays in licensure exams predict poorer performance.[15–17]

Failure on high-stakes exams carries financial, emotional, and reputational consequences for students and programs.[18–20] Passage rates also serve as indicators of program quality, influencing institutional reputation and accountability.[21,22]

Methods

Study Design

This study used a time-series categorical design to examine whether the length of delay between EMT course completion and the National Registry EMT exam was associated with first-attempt pass/fail outcomes. A categorical design was selected because the primary variable of interest, days elapsed before testing, was naturally grouped into discrete intervals rather than measured continuously. This approach allowed comparison of pass rates across meaningful time windows while maintaining adequate statistical power given the sample size.

Study Setting and Population

The study included all students (N = 714) who successfully completed a state-approved EMT course at a large public university in Los Angeles County, California between January 1, 2013 and June 19, 2025. Only first-time examinees were included. Exam outcomes were obtained from program director reports available through the National Registry of EMTs (NREMT). These reports provide pass/fail results and exam dates but do not include individual scores.

Grouping and Variables

Students were categorized into nine groups based on the number of days between course completion and exam attempt:

Group 1: 1–15 days
Group 2: 16–30 days
Group 3: 31–45 days
Group 4: 46–60 days
Group 5: 61–75 days

Group 6: 76–90 days
Group 7: 91–105 days
Group 8: 106–120 days
Group 9: >120 days

The dependent variable was exam outcome (pass/fail). The independent grouping variable was "time to exam," operationalized as categorical intervals. While time to exam was treated as the primary grouping variable it is not a true independent variable in the causal sense. For example, factors such as student confidence, awareness of retake opportunities, and personal circumstances may influence when students choose to test. These influences were not measured in this study and represent important limitations.

A categorical time-series design was chosen because the 12-year timeframe provided sufficient data for meaningful subgroup analysis, the sample size of 714 students allowed adequate statistical power for comparisons across nine groups, and the categorical grouping reflected practical decision points for students, such as testing within 30 days versus delaying beyond 60 days. This approach also aligns with prior studies in medical licensure that examine delay intervals rather than continuous measures, as shown by Marco et al[15] and Onishi.[16]

Statistical Analysis

Descriptive statistics were calculated for each group. A one-way analysis of variance (ANOVA) was conducted to test for differences in pass rates across groups. Effect size was reported using eta squared (η^2). Kendall's Tau correlation was also calculated to assess the strength and direction of association between delay group and exam outcome. Statistical significance was set at $p < 0.05$. Analyses were performed using standard statistical software.

Ethical Approval

This study was approved as exempt research by the Institutional Review Board. Permission was granted by the NREMT to use program director data.

Results

A total of 714 students completed the EMT course and attempted the National Registry exam during the study period (2013–2025). Outcomes are reported both by delay group (Tables 1–4) and by year (Table 5), the latter to account for variation across time, including the COVID-19 pandemic years (2020–2022).

Table 1 Student Groups by Duration and Pass-Fail Results

Group Number	Days from Course Completion to Exam	Number of Students	Percentage of Students Taking Exam	Pass Rate	Percentage of Total Students in Study	Number Who Fail on First Attempt	Percentage of Total Students in Study
1	1-15	54	7.56	40 (74%)	5.60	14	1.96
2	16-30	155	21.70	113 (72%)	15.82	42	5.88
3	31-45	108	15.12	75 (69%)	10.50	33	4.62
4	46-60	92	12.88	51 (55%)	7.14	41	5.74
5	61-75	54	7.56	35 (64%)	4.90	19	2.66
6	76-90	41	5.74	18 (44%)	2.52	23	3.22
7	91-105	30	4.20	15 (50%)	2.10	15	2.10
8	106-120	17	2.38	10 (59%)	1.40	7	0.98
9	>120	163	22.82	76 (46%)	10.64	87	12.18

Table 2 Descriptive Statistics

Group	n	Mean	Std. Deviation
1	54	0.74	0.44
2	155	0.73	0.45
3	108	0.69	0.46
4	92	0.55	0.5
5	54	0.65	0.48
6	41	0.44	0.5
7	30	0.5	0.51
8	17	0.59	0.51
9	163	0.47	0.5
Total	714	0.61	0.49

Table 3 ANOVA

	Sum of Squares	df	Mean Square	F	p
Group	9.18	8	1.15	5.02	<0.001
Residual	161.23	705	0.23		
Total	170.41	713			

Table 4 Group Outcomes by Delay Interval (Aggregated Totals)

Group	Days from Course Completion to Exam	Number of Students (n)	% of Students Taking Exam	Number Passed	Pass Rate (%)	Number Failed	% of Total Students (Fail)
1	1–15	54	7.56	40	74%	14	1.96
2	16–30	155	21.70	113	72%	42	5.88
3	31–45	108	15.12	75	69%	33	4.62
4	46–60	92	12.88	51	55%	41	5.74
5	61–75	54	7.56	35	64%	19	2.66
6	76–90	41	5.74	18	44%	23	3.22
7	91–105	30	4.20	15	50%	15	2.10
8	106–120	17	2.38	10	59%	7	0.98
9	>120	163	22.82	76	46%	87	12.18
Total	—	714	100	433	61%	281	39%

Table 5 Annual Pass Rates for First-Attempt EMT Exam (2013–2025)

Year	Number of Students (n)	Number Passed	Number Failed	Pass Rate (%)
2013	38	25	13	65.79%
2014	71	44	27	61.97%
2015	88	41	47	46.59%
2016	56	33	23	58.93%
2017	80	46	34	57.50%
2018	80	47	33	58.75%
2019	74	53	21	71.62%
2020*	18	17	1	94.44%
2021*	52	40	12	76.92%
2022*	33	15	18	45.45%
2023	30	17	13	56.67%
2024	66	41	25	62.12%
2025†	28	14	14	50.00%
Total	**714**	**433**	**281**	**60.64%**

Notes: *2020–2022: Pass rates during these years may have been affected by the COVID-19 pandemic, which disrupted EMT course delivery, clinical placements, and testing availability.†2025: Data for 2025 are partial, covering January 1 through June 19, 2025, only.

Group Outcomes

Pass rates varied across the nine delay groups. Students who tested within 1–45 days (Groups 1–3) had the highest success rates, ranging from 69% to 74%. Group 4 (46–60 days) showed a marked decline to 55%, but this was followed by a rebound in Group 5 (61–75 days) to 64%. Group 8 (106–120 days) also demonstrated a moderate pass rate of 59%, suggesting that Group 4 may represent an anomaly rather than a consistent downward trend. The lowest pass rates were observed in Group 6 (44%) and Group 9 (>120 days, 46%). Importantly, Group 9 contained the largest proportion of test-takers (22.8% of the sample), underscoring the significance of extended delays in advising and program policy. See Table 1.

Annual Trends and COVID-19 Impact

Annual pass rates are presented in Table 5. From 2013 through 2019, pass rates remained relatively stable, averaging between 57% and 71%. During the COVID-19 pandemic (2020–2022), pass rates fluctuated sharply: 2020 showed an unusually high rate (94%), 2021 remained elevated (77%), but 2022 dropped to 45%. These swings likely reflect disruptions in instructional delivery, access to testing centers, and student readiness during that period. By 2023–2025, pass rates rebounded to pre-pandemic levels (56–62%), suggesting that the pandemic's impact was temporary and did not alter the long-term relationship between exam delay and success.

Statistical Analysis

ANOVA (Table 3) confirmed significant differences in pass rates across groups ($F(8,705) = 5.02$, $p < 0.001$). Kendall's Tau correlation (Table 2) indicated a negative association between delay group and pass rate ($\tau = -0.29$, $p < 0.001$). Effect size ($\eta^2 = 0.05$) suggested a medium impact of delay on exam outcome (Table 3). Importantly, the variability across groups demonstrates that delay is not a strictly linear predictor; anomalies such as Group 4 and rebounds in Groups 5 and

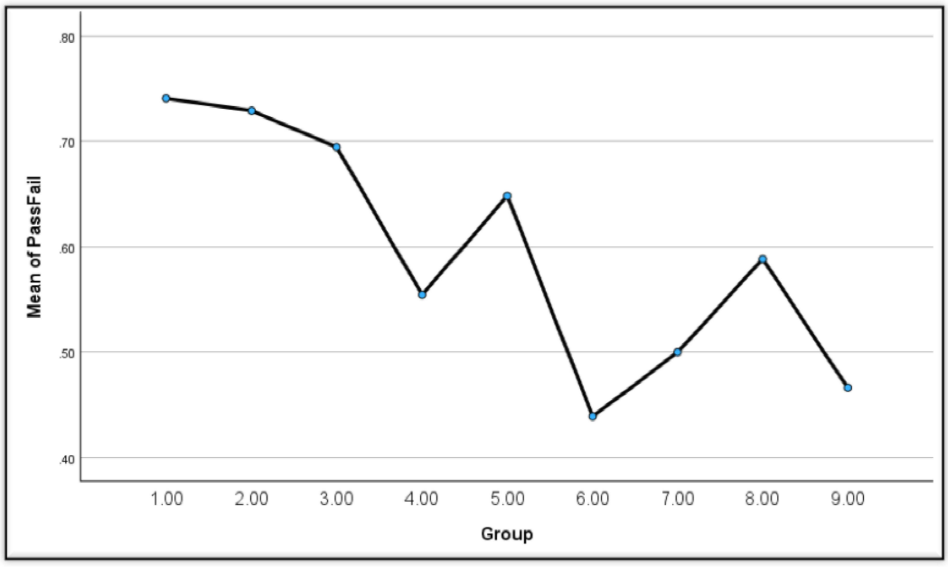

Figure 1 Means Plots for Time Groups.

8 highlight the need for nuanced interpretation. These trends are illustrated in Figure 1, which presents the mean pass rates across the time-delay groups.

Interpretation

The results confirm that shorter delays (1–45 days) are associated with higher pass rates, but also reveal that outcomes fluctuate across later groups. The decline after 45 days is not uniformly progressive, as evidenced by rebounds in Groups 5 and 8. The largest cohort, Group 9, had the lowest overall success rate, reinforcing the risk of extended delays. See Table 1. Annual analysis further demonstrates that external factors, such as the COVID-19 pandemic, can influence outcomes beyond the delay variable alone (Table 5).

Discussion

This study provided several important findings. First, a delay in taking the EMT national registry exam is associated with failure. However, the results also show that the relationship is not strictly linear. Group 4's unexpectedly low pass rate (55%) followed by a rebound in Group 5 (64%) and moderate success in Group 8 (59%) suggests that cohort-specific or instructional factors may have influenced outcomes. These anomalies highlight the need for further investigation into program-level variables, such as instructor changes, textbook transitions, or student support resources.

Second, Group 9 (>120 days) contained the largest proportion of test-takers (22.8%) yet had one of the lowest pass rates (46%). This finding underscores the importance of advising students against extended delays and may justify institutional policies that encourage or require earlier exam scheduling.

Third, annual analysis revealed that the COVID-19 pandemic disrupted pass rates, with unusually high success in 2020–2021 followed by a sharp decline in 2022. These fluctuations likely reflect temporary changes in instructional delivery and testing access rather than a fundamental shift in the delay–outcome relationship. By 2023–2025, pass rates returned to pre-pandemic levels, suggesting resilience in the long-term trend.

Limitations

This study has several limitations. First, it focuses on EMT students from a single public university in Los Angeles County, California, over a 13-year period (2013–2025). While the sample size is substantial, the findings may not generalize to other EMT programs nationwide, which vary in format, duration, cost, instructional delivery, and institutional support.

Second, although the study demonstrates a statistically significant association between exam delay and first-attempt failure, it does not account for other variables that may influence both delay and outcome. These include student motivation, employment status, financial constraints, awareness of retake policies, and personal circumstances, all of which were outside the scope of this analysis.

Third, instructional factors, such as instructor turnover, teaching style, and curriculum delivery may have affected student performance. While the program followed a fixed curriculum, variations in pedagogy, such as the use of open-ended questions, peer learning, or digital enhancements, could have influenced knowledge retention and exam readiness.

Fourth, textbook changes and digital access evolved during the study period. Students used different editions of prehospital emergency care textbooks, and some opted into supplemental digital tools, such as interactive quizzes and video modules. These resources were not uniformly adopted or tracked, and their impact on exam performance remains unknown.

Fifth, while annual pass rates were analyzed to account for temporal variation, the study did not directly measure the impact of external disruptions, such as the COVID-19 pandemic. The fluctuations observed in 2020–2022 suggest that broader contextual factors, such as access to testing centers or shifts in instructional modality, may have influenced outcomes beyond exam delay alone.

Finally, anomalies in group outcomes (eg, Group 4's lower pass rate followed by rebounds in Groups 5 and 8) suggest that cohort-specific or instructional effects may be present. These patterns warrant further investigation but were not captured in the current dataset. Without additional data on individual student circumstances and program-level variables, the findings should be interpreted with caution and not generalized to all EMT certification settings.

Conclusions

This study demonstrated that delaying the National Registry EMT exam after course completion is significantly associated with first-attempt failure. Students who tested within 45 days, particularly those within the first 30 days, had the highest pass rates, while those who delayed beyond 60 days experienced a marked decline in success. The largest cohort of test-takers fell into Group 9 (>120 days), which also had the lowest pass rate, underscoring the risks of extended delays and the need for proactive advising and institutional support.

Importantly, the relationship between delay and exam outcome is not strictly linear. Anomalies such as Group 4's lower pass rate and rebounds in Groups 5 and 8 suggest that cohort-specific or instructional factors may influence performance. Annual trends further revealed that external disruptions, such as the COVID-19 pandemic, affected pass rates in ways that extend beyond exam timing alone. While pass rates fluctuated during 2020–2022, they returned to pre-pandemic levels by 2023, indicating resilience in the long-term trend.

These findings offer actionable insights for program directors, instructors, and students. Encouraging timely exam scheduling, ideally within 30 days of course completion, may improve certification outcomes. Future research should explore second and third exam attempts, the role of remedial instruction, and broader programmatic variables that influence student success.

Informed Consent Disclosure and Ethical Approval Statement

The authors declare that this study was exempted by the Institutional Review Board (IRB) at California State University, Long Beach (CSULB) as "Not Human Subjects Research" under 45 CFR 46.102(l). The CSULB Ethical Approval Number is 2339037-1. The following statement from the CSULB IRB committee substantiates this exemption:

> The CSULB IRB has determined this New Project does not meet the definition of research under 45 CFR 46.102(l): Research means a systematic investigation, including research development, testing, and evaluation, designed to develop or contribute to generalizable knowledge. IRB review and approval is not required.

A copy of the memo verifying this exemption will be provided upon request. Informed consent was waived for this study.

Acknowledgments

The authors did not use a generative artificial intelligence (AI) tool or service to assist with preparation or editing of this work. The authors take full responsibility for the content of this publication.

Disclosure

The authors declare that they have no known financial interests or personal relationships that could have appeared to influence the work reported in this document/paper/study.

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