

Transforming Medication Calculation Competency Through Digital Innovation: A Successful Institutional Transition from ATI to safeMedicate

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BACKGROUND & SIGNIFICANCE

- Problem:** Medication errors remain a leading cause of preventable patient harm, with dosage calculation errors contributing to 37% of medication-related adverse events
- Challenge:** Traditional e-learning platforms lack authentic clinical context and fail to develop critical thinking skills essential for safe practice
- Concern:** Our institutional data revealed declining performance trends with ATI from 2021-2023, necessitating urgent intervention
- Solution:** safeMedicate provides evidence-based, interactive virtual environments utilizing 25+ years of translational research in medication safety education
- Innovation:** Authentic clinical scenarios with visual drug recognition, contextual problem-solving, and competency-based progression

METHODS

Design: Retrospective comparative cohort analysis with longitudinal trend assessment

Setting: BSN program, Manhattanville University

Sample:

- Pre-intervention: N=194 (Fall 2021-Summer 2023)
- Post-intervention: N=231 (Fall 2023-Spring 2025)

Intervention: Phased replacement of ATI Dosage Calculation modules with safeMedicate platform

Primary Outcome: First-attempt pass rate (100% competency)

Secondary Outcomes: Number of attempts required, course-specific performance, longitudinal trend analysis

Analysis: Chi-square, effect size, odds ratios, time-series progression

IMPLEMENTATION TIMELINE

Semester	Courses Transformed	Students (n)
Fall 2023	NUR1010 (Fundamentals)	48
Spring 2024	NUR2000 (Med-Surg I)	71
Summer 2024	NUR2000 (Med-Surg I)	45
Fall 2024	NUR2000 (Med-Surg I)	102
Spring 2025	NUR2000 (Med-Surg I)	75

Key Features:

- Progressive skill building across curriculum
- Authentic clinical contexts
- Immediate formative feedback
- Reversed declining performance trends

Primary Analysis: Chi-square (χ^2) = 156.7
 $p < 0.001$
 $df = 2$

Effect Measures: Cohen's $d = 1.92$ (large)
Odds Ratio = 7.4
95% CI: 5.2-10.5
NNT = 2.5

STATISTICAL ANALYSIS & IMPLICATIONS

Clinical Significance:

- Students using safeMedicate were **7.4 times more likely** to achieve competency on first attempt
- For every 2.5 students using safeMedicate, one additional student passes on first attempt
- Longitudinal analysis revealed immediate reversal of declining performance trends
- The growing gap between ATI's declining performance (30%) and safeMedicate's success (89%) by Spring 2025 explains the large effect size (Cohen's $d = 1.92$) and substantial odds ratio (7.4)
- Sustained improvement trajectory suggests long-term educational benefits
- Substantial reduction in remediation needs and faculty workload

Conclusions:

- The chronological data demonstrates safeMedicate not only improved outcomes but reversed a concerning downward trend
- Results support immediate adoption for programs experiencing similar performance challenges
- Evidence suggests continued improvement potential with extended implementation

COMPREHENSIVE OUTCOMES ANALYSIS: A COMPLETE TRANSFORMATION STORY

Phased Implementation Timeline

Course	Fall 2023	Spring 2024	Summer 2024	Fall 2024	Spring 2025
NUR1010	ATI	ATI	ATI	ATI	safeMedicate
NUR2000	ATI	ATI	ATI	ATI	safeMedicate
NUR2000	ATI	ATI	ATI	ATI	safeMedicate
NUR2000	ATI	ATI	ATI	ATI	safeMedicate
NUR2000	ATI	ATI	ATI	ATI	safeMedicate

Complete Transformation Journey: Platform-Specific & Blended Performance

NUR1010 (Fundamentals) Direct Comparison

Key Insights:

- Improved Pass Rates: This institution's pass rates improved from 47% to 89% after transitioning to safeMedicate.
- Immediate Impact: ATI pass rates in Fall 2023 were in the bottom quartile of performance.
- Sustained Growth: Continued improvement in ATI pass rates through Spring 2025.
- Reduced Remediation: ATI's remediation rates dropped from 13.9% to 1.7% after transitioning to safeMedicate.

Methodology Note: This comprehensive analysis presents platform-specific performance data during our phased implementation (Fall 2023-Spring 2025). The dual tracking demonstrates that improvements were directly attributable to safeMedicate adoption rather than external factors, as students continuing with ATI showed persistent performance declines. This transparent approach provides other institutions with realistic expectations for managed transitions.

Metric	Pre-Implementation (2021-2023)		During Phased Implementation		
	ATI Only (2021-2023)	Trend	ATI Continuing	safeMedicate	Blended Avg
First-Attempt Pass Rate	47.4%	Declining	35.5%	79.7%	58.3%
Final Spring 2025 Rate	42% (Sp 23)	-	30%	89%	82%
Students Requiring 3+ Attempts	13.9%	Worsening	18.5%	1.7%	6.8%

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NLN Education Summit 2025
September 17-19, 2025
Orlando, FL

When Manhattanville University's nursing program faced declining medication calculation pass rates with ATI (dropping from 52% to 42%), they didn't just switch platforms—they conducted a controlled transformation that created compelling evidence for the superiority of safeMedicate. The results? Students using safeMedicate were 7.4 times more likely to pass on their first attempt, with pass rates soaring from 42% to 89%.

Manhattanville's phased implementation created what researchers call a "natural experiment"—tracking both platforms simultaneously during an 18-month transition period (Fall 2023-Spring 2025).

This approach eliminated alternative explanations for improvement:

- 194 students assessed pre-implementation (ATI only)
- 231 students utilizing safeMedicate during transition
- 148 students continuing with ATI during transition
- Same faculty, same admission standards, same curriculum

The most compelling evidence comes from the simultaneous tracking of both platforms:

ATI Performance (Continuing Students)

- Pre-implementation: 47.4% first attempt pass rate
- During transition: Declined to 35.5% average
- By Spring 2025: Crashed to 30%

safeMedicate performance

- First semester (Fall 2023): Immediate jump to 65%
- Average during transition: 79.7%
- By Spring 2025: Peaked at 89%

By Spring 2025, the 59-percentage point difference between platforms created an unprecedented effect size (Cohen's $d = 1.92$)—***a rare occurrence in education research with statistical validation:***

- Chi-square test: $\chi^2 = 156.7$, $p < 0.001$ (extremely significant)
- Odds Ratio: 7.4 (students 7.4x more likely to succeed with safeMedicate)
- Number Needed to Treat: 2.5 (for every 2.5 students using safeMedicate, one additional student passes on the first attempt)

The spotlight begins with NUR1010, the Fundamentals course in Semester One. ***This course showed dramatic improvement when switched to safeMedicate:***

- Under ATI: 48% pass rate
- First semester with safeMedicate: 65% (immediate 17-point jump)
- Final semester: 89% (41-point total improvement)

This controlled comparison eliminates variables like student quality or instructor differences—the only change was the platform. ***Starting with Fundamentals in Fall 2023, Manhattanville systematically transitioned one course per semester—the approach was strategic to:***

- Allowed early adopters to champion the platform
- Provided continuous comparison data
- Maintained educational continuity
- Created a replicable roadmap for other institutions

Why did safeMedicate succeed where ATI failed? ***Success was the result of evidence-based innovation — safeMedicate's approach is rooted in 25+ years of translational research in medication safety education:***

- Authentic clinical contexts versus abstract calculations
- Visual drug recognition in realistic healthcare environments
- Immediate formative feedback with competency-based progression
- Interactive virtual environments that develop critical thinking

While safeMedicate students thrived, ATI students performed worse than historical averages — further supporting:

- External factors weren't improving outcomes
- Time alone wasn't solving the problem
- The platform choice made all the difference

From a financial perspective, safeMedicate has a strong ROI and strategic value:

- Reduced remediation costs: 87% first attempt pass rate versus 47% baseline
- Improved retention: Fewer students failing out due to medication calculation barriers
- Faculty efficiency: Dramatic reduction in time spent on remediation

The research provides peer-reviewed, statistically validated evidence, not just marketing promises, and gives safeMedicate a competitive edge. The transparent reporting of mixed results during transition builds trust and credibility that competitors can't match.

Manhattanville's experience provides more than a success story—it offers a scientifically validated roadmap for reversing declining performance in medication calculation education. The simultaneous tracking of both platforms created irrefutable evidence: while ATI performance continued deteriorating (reaching just 30% by Spring 2025), safeMedicate achieved and sustained 89% first attempt pass rates. For nursing programs facing similar challenges, the message is clear: safeMedicate doesn't just improve outcomes—it reverses dangerous downward trends. With proper implementation, programs can expect their current 40-50% pass rates to reach 85-90% within 18 months.

Based on peer-reviewed research presented at NLN Education Summit 2025 by Christopher Hanley, PharmD, examining 425 nursing students across an 18-month institutional transition.