# Do Drug Competency Assessments Work?

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## Key Take-Aways

- Unsuccessful model for drug competency assessment
- Too frequent testing of drug knowledge may overwhelm a learner and diminish ability to learn (a finding consistent with educational literature)
- Best practice for evaluating progress to drug knowledge mastery still needs to be determined

## Background

- Competency-based design endorsed by 2016 accreditation standards including areas of drug therapeutic use and side effects
- Repeated practice via sequenced low-stakes assessments has been proposed as a means of ensuring mastery learning (i.e. full ability)
- No published models evaluate how best to assess progress towards drug knowledge competency

## Objective

To evaluate the effectiveness of a novel drug competency assessment strategy in third professional year pharmacy students

## Master Drug List

- 461 medications covering 9 domains:

| | | |
|---|---|---|
| Cardiology (C) | Respiratory (R) | Endocrine (E) |
| Immunology (I) | Infectious disease (ID) | Gastrointestinal (GI) |
| Renal | Pain | Neurology-Psychiatry (NP) |

- Content and relevance chosen via NAPLEX preparation materials, clinical pharmacist expert opinion, and consensus with 3 additional clinical pharmacists
- Drug Knowledge categories

Brand / Generic | Therapeutic Class | Side Effects | Warnings/ Contra-Indications

## Methods

Design: Phased retrospective comparison

- 3-phase drug competency assessment in spring 2022 using the institutional master drug list ***(Figure 1)***
- 13 assessments including multiple choice and case-based questions asked student to recall pertinent medication information from the master drug list
  - 9 low-stakes quizzes (2 attempts, on-your-own)
  - 3 formative tests (lock-down browser)
    - 30 questions each covering the 3 prior domains
  - 1 summative comprehensive 60-question final
    - To pass: must earn ≥ 73%
    - If unsuccessful, 2 remediation attempts given (if none were successful, a zero recorded for score)

Analysis:

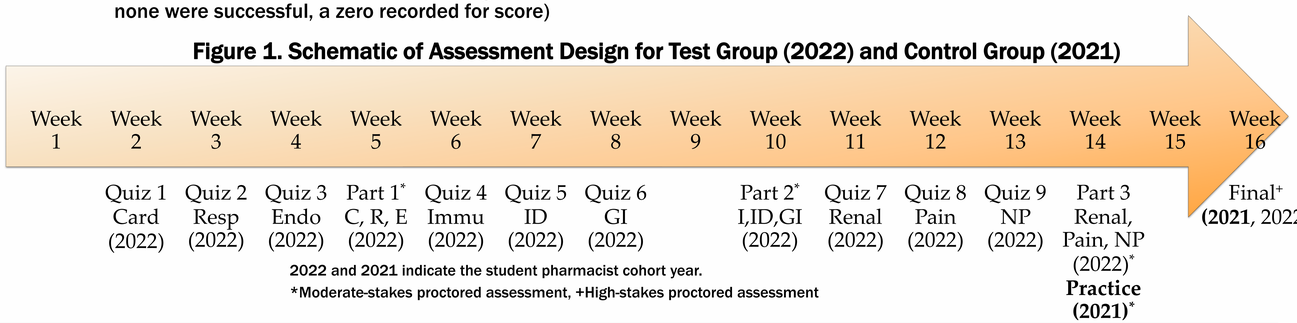
- Demographics, correlation and sensitivity analysis

Phased competency design (test group - spring 2022) vs. previous year's design (control group - spring 2021)

- Spring 2021 - only one practice exam and the final summative comprehensive competency
- *Same between years, including pass threshold and proctoring*

- Sub analysis with removal of failures between cohorts

**Figure 1. Schematic of Assessment Design for Test Group (2022) and Control Group (2021)**




2022 and 2021 indicate the student pharmacist cohort year.
*Moderate-stakes proctored assessment, +High-stakes proctored assessment

## Results

**Table 1. Student Pharmacist Demographics**

| Student Cohort | Control - Spring 2021 N (%) | Test - Spring 2022 N (%) |
|---|---|---|
| Sample Size | 43 (100) | 48 (100) |
| Female | 30 (69.7) | 33 (68.8) |
| Race | | |
| *Caucasian* | 37 (86) | 38 (79) |
| *African American* | 2 (5) | 5 (10) |
| *Other* | 4 (9) | 5 (10) |

**Table 2. Comparison of Performance Between Groups**

| Student Cohort | Control Group Mean (SD) | Test Group Mean (SD) | p-value | 95% Confidence Interval |
|---|---|---|---|---|
| Final summative exam score | 81.9 (9.3) | 80.9 (10.5) | 0.64 | 1.005 (-3.2, 5.2) |
| Exam score removing failed first attempts (i.e., scores <73%) | 84.3 (7.1) | 84.3 (7.4) | 0.97 | 0.053 (-3.3, 3.4) |

- The 2021 practice exam moderately correlated with final exam performance – statistically significant (r = 0.62, p< 0.001)
- Number of attempts on low stakes assessments - low correlation with final exam score in 2022 cohort (r = 0.24)

## Discussion

Design didn't demonstrate improved drug knowledge

- Inconsistent with prior studies on small, low-stakes testing

Why we theorize it didn't work

- Cognitive load with frequent assessments?
- Volume of drug information per drug? Number of drugs?
- Volume of drugs on each moderate and final assessment?
- Testing anxiety (competency threshold)?
- Quiz / test / multiple choice design vs. real world?
- Individual characteristics of learners?

## Implementation Challenges

- High faculty and TA time spent writing, proofing, overseeing and assessing (>350 hours, 840 questions)
- Assessor mental workload with assessment rigor

## Limitations

- Small changes in drug characteristic list between years
- Short term outcome vs. rotations/NAPLEX, etc.
- Grades only are one method to evaluate knowledge
- Generalizability

## Conclusion and Next Steps

- Limitations to use of a layered drug competency assessment model – need to try other models

Next steps:

- Reduce detail volume on list
- Add a practice exam
- Consider other assessment types for documenting APPE drug knowledge readiness

## References

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