# Quantification of Risk Associated with Poor Performance on COMLEX-USA Level 2CE

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**PURPOSE:** To explore Absolute Risk Reduction (ARR) as a measure to quantify the effect size of variables correlated with COMLEX Level 2CE (L2CE) failures and identify opportunities for early intervention.

**Introduction:** This model investigated concepts commonly used in epidemiology for assessing disease risk between two groups.



The student metrics, or risk factors (exposure), analyzed included cumulative M1-M2 grade point average, COMLEX Level 1 (L1) passing, and COMAT mean. The "disease outcome" is COMLEX Level 2CE (L2CE) failure (sick) and passing (well). For this presentation, examples are provided for GPA and COMAT mean. Any parameter can be used.

## Methods:

- A cohort of 430 M4 students from 3 campuses
- Pearson's r was calculated to identify highly correlated independent variables (risk factors) associated with performance on L2CE.
- ARR ( also known as Risk Difference) for failing L2 CE was calculated by subtracting the Experimental Group Incidence of L2CE Failures  for Metric $\geq$ Threshold from the Comparison Group incidence of L2CE Failures for Metric < threshold for different  risk factors.
- 2x2 Table and Formulas

**L2 CE OUTCOME**

| METRIC | Fail L2CE | Pass L2CE | Total | Incidence (Event Rate) |
|---|---|---|---|---|
| $\geq$ Threshold | A | B | A+B | A/(A+B) |
| < Threshold | C | D | C+D | C/(C+D) |

Experimental Event Rate (EER) = A/A+B
Control Event Rate (CER) = C/C+D
Relative Risk Reduction (RRR) = CER-EER/CER
Absolute Risk Reduction (ARR) = CER-EER
Absolute Risk Increase (ARI) = EER-CER

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Risk of failing Level 2CE is correlated with several factors. Factors such as GPA and passing COMLEX Level 1 are fixed variables.

Assessing the mean COMAT score for each student after each exam allows for identification of students who perform below a certain threshold associated with a high excess risk of Level 2 CE failure.  Active surveillance of mean COMAT scores provides opportunities for intervention during M3 to increase the proportion of students passing COMLEX Level 2CE.



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## RESULTS:

- Pearson's r results for L2CE score were significant at p<0.001 (df=428) for GPA (r=0.66), L1 score (r= 0.82), and mean COMAT Score (MCS) (r=0.86).
- Comparing students' GPA with risk for failing L2CE.

| | L2<400 (disease) | L2≥400 (no disease) | Total | Event Rate (%) |
|---|---|---|---|---|
| GPA ≥2.5 (exposed) | 33 | 363 | 396 | 8.3 |
| GPA <2.5 (unexposed) | 6 | 16 | 22 | 27.3 |
| Total | 39 | 379 | 418 | |

ARR = 6/22 − 33/396 = 0.273 − 0.083 = 0.19
or  27.3% − 8.3% = 19%

ARI = 33/396 − 6/22- = 0.083− 0.273 =  -0.19
or  8.3% − 27.3% =  |- 19%| = 19%

➤ Students with a GPA ≥ 2.5 had a 19% absolute risk reduction for failing L2CE.
➤ Students with a GPA< 2.5 had a 19% absolute risk increase for failing L2CE.

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## RESULTS:

- Comparing students' L1 first attempt score with the risk for failing L2CE.

| | L2<400 (disease) | L2≥400 (no disease) | Total | Event Rate (%) |
|---|---|---|---|---|
| L1 ≥ 400 (exposed) | 31 | 358 | 389 | 8.0 |
| L1 < 400 (unexposed) | 8 | 21 | 29 | 27.6 |
| Total | 39 | 379 | 418 | |

ARR = 8/29 − 31/389 = 0.276 − 0.080 = 0.196
or  27.6% − 8.0% = 19.6%

ARI  = 31/389 - 8/29 = 0.080 − 0.276 = - 0.196
or  8.0% − 27.6% =  |- 19.6%|

➤ Students passing L1 had a 20% absolute risk reduction for failing L2CE.
➤ Students who failed L1 had a 20% absolute risk increase for failing L2CE.

- Comparing students' cumulative mean COMAT* score with the failing L2CE.

| | L2<400 (disease) | L2≥400 (no disease) | Total | Event Rate (%) |
|---|---|---|---|---|
| Mean COMAT ≥ 90 (exposed) | 26 | 369 | 395 | 6.6 |
| Mean COMAT < 90 (unexposed) | 20 | 15 | 35 | 57.1 |
| Total | 46 | 384 | 430 | |

ARR = 20/35 − 26/395 = 0.571 − 0.066 = 0.505
or  57.1% − 6.6% = 50.5%

ARI = 26/395 − 20/35 = 0.066 − 0.571 = - 0.505
or  6.6% − 57.1% =  |- 50.5%|

RRR = ARR/CER =0.505/0.571 =0.8844 = 88%

➤ Students who had a mean COMAT Score ≥90 had a 51% absolute risk reduction for failing L2CE.
➤ Students who had a mean COMAT score <90 had a 51% absolute risk increase for failing L2CE.
➤ ***Students with a mean COMAT ≥90 have a reduced risk of failing L2CE by 88% relative to students with a mean COMAT <90.***

\* This analysis includes COMAT scores that were remediated to meet the school's minimum passing score.

**Conclusion:** Student success on NBOME Licensing Exams is an important milestone in securing post graduate training positions and fulfilling personal career goals. Among the variables analyzed, the mean COMAT score is the risk factor with the largest risk difference for failing L2CE. The mean COMAT score is also a strong predictor (r) of L2CE performance. Calculating risk difference is a novel method that provides strong evidence to support counseling students with a mean COMAT score below a prescribed threshold after each successive COMAT to encourage improved performance on subsequent COMAT exams. The opportunity to use mean COMAT scores to intervene monthly is a new approach to counseling students during M3 clerkships training.