A Call for Change: Clinical Evaluation of Student Registered Nurse Anesthetists

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The ability to integrate theory with practice is integral to a student's success. A common reason for attrition from a nurse anesthesia program is clinical issues. To document clinical competence, students are evaluated using various tools. For use of a clinical evaluation tool as possible evidence for a student's dismissal, an important psychometric property to ensure is instrument validity. Clinical evaluation instruments of nurse anesthesia programs are not standardized among programs, which suggests a lack of instrument validity. The lack of established validity of the instruments used to evaluate students' clinical progress brings into question their ability to detect a student who is truly in jeopardy of attrition. Given this possibility, clinical instrument validity warrants research to be fair to students and improve attrition rates based on valid data. This ex post facto study evaluated a 17-item clinical instrument tool to demonstrate the need for validity of clinical evaluation tools. It also compared clinical scores with scores on the National Certification Examination.

Keywords: Clinical evaluation, clinical training, factor analysis, instrument validity, National Certification Examination.

Most nurse anesthesia (NA) programs use preadmission criteria (eg, overall grade point average [GPA], science GPA, Graduate Record Examination [GRE] scores, and years of acute care experience) that allow faculty to narrow a large applicant pool; however, these selection criteria do not ensure positive progression and graduation for students selected.[1] The most common reasons for attrition were withdrawal, dismissal for poor classroom performance, leave of absence, and dismissal for clinical reasons. Every loss represents a waste of individual and institutional resources. Ensuring valid evaluation of students is important in decreasing attrition, waste, and potential legal action.

One important component of attrition is clinical performance that does not meet program expectations. Cadman and Brewer[2] noted that individuals in professional nursing need to be able to blend and integrate both theory and practice. Nurse anesthesia training requires ongoing clinical evaluation of students by Certified Registered Nurse Anesthetist (CRNA) preceptors. Failing to meet required academic and clinical guidelines places students in jeopardy of program dismissal.[1] Although the need to clinically evaluate student registered nurse anesthetists (SRNAs) is evident, the clinical evaluation must be done using valid tools that are fair to both the program and the student.

Clinical tools are often used to document satisfactory or unsatisfactory progression in the clinical setting. However, institutionally derived clinical evaluation tools may lack reliability, validity, or both.[3] If a clinical evaluation tool can be used as evidence for a student's dismissal, an important psychometric property to ensure is instrument validity. *Instrument validity* is defined as the degree to which an instrument measures what it is intended to measure and the extent to which the values obtained (eg, scores obtained on a clinical evaluation tool) are similar to the true values (eg, the observed behavior). Clinical evaluation instruments for NA programs are not standardized among programs. Although different clinical evaluation tools may each be valid, are NA programs determining the validity of their evaluation tools? A lack of established validity of the instruments used to evaluate students' clinical progress brings into question their ability to detect a student who is truly in jeopardy of attrition. Given this possibility, clinical instrument validity warrants research to be fair to students and improve attrition rates based on valid data.

Methods

An ex post facto cross-sectional study design was used to gather data at 2 critical times in NA programs. Institutional review board approval was obtained from each institution participating in the study.

The purposive sample included all 137 current students in each of 4 accredited NA programs in the southeastern United States. Purposive sampling is used when respondents are chosen based on a special purpose,[4] which in this case was to create factor analysis and factor loadings of the clinical instrument. Post hoc analysis of National Certification Examination (NCE) data collected from each participant also allowed correlations and multiple linear regressions[5] to explore the relationship between clinical scores and NCE scores.

• ***Clinical Evaluation Instrument.*** The clinical evaluation instrument (Table 1) measures clinical performance and is composed of questions that assess a student's clinical acumen. Questions are focused on several key areas related to the development and progress of the student, and include patient assessment and anesthetic plan, didactic transfer of knowledge to clinical practice, perianesthetic management, communication skills/professionalism, and care and preparation of equipment. Scores are given on a 4-point Likert scale, with 4 indicating above expectations and 1 failure. The final question is an overall clinical impression compared with peers' scores.

For convenience, the researcher used the clinical evaluation instrument (see Table 1) from one of the programs. Variables examined in relation to SRNAs' clinical success included 17 items from a clinical evaluation tool and 3 second-order clinical factors—or constructs (described in the Results section)—derived from the factor analysis. Second-order factors are commonly used to describe the relationship among all factors.

A faculty member responsible for clinical evaluations from each NA program completed the clinical evaluation instrument on each student from 2 different cohorts: those at 1 year and those in the last semester. Students in the first semester had not started clinical rotations and therefore did not receive a score. The program faculty completing the clinical evaluation tools may or may not have been familiar with the participant's academic performance. Completed clinical evaluation instruments were then sent back to the researcher either by password-protected electronic PDF or by US mail.

• ***Factor Analysis.*** The expectation was that the clinical instrument might not be measuring as many variables as it was created to evaluate. Therefore, factor analysis using software (SPSS) was performed to identify the underlying constructs that make up the clinical instrument scores. Factor analysis of clinical evaluation tools has not been performed in previous NA studies, to the authors' knowledge.

Factor analysis is one of the most important tools used for estimating the validity of an instrument. A factor is a group of items that may be said to belong together. A person who scores high in one variable likely will score highly on a variable in the same factor grouping, and vice versa. Such an item has high correlations with other items of the same factor and not so high correlations with items of different factors.[6]

Factor analysis empirically looks at the concepts being measured. The authors ran factor analysis on the 17 subscales in the clinical evaluation tool and applied it only to those students in the clinical portion of their curriculum (at year 1 and in the final semester).

The *eigenvalue* for a given factor measures the variance in all the variables that are accounted for by that factor. The ratio of eigenvalues is the ratio of explanatory importance of the factors with respect to the variables. If a factor has a low eigenvalue, it is contributing little to the explanation of variances in the variables and may be ignored as redundant with more important factors. Eigenvalues measure the amount of variation in the total sample accounted for by each factor.

Results

The researcher has provided eigenvalues (Table 2) and a scree plot (Figure) to be clear regarding the chosen factors in the factor analysis.

Factor analysis for the 17-item clinical instrument (N =137) identified 3 underlying constructs as being measured (see Table 2). These factors are (1) the student's ability to perform technical skills related to practice (technical skills), (2) the student's ability to relate to self and others (patient-focused concept, which is the emotional intelligence concept), and (3) the student's ability to manage resources (resource management). These 3 factors explain 66% of the variance in the scale.

Factor loadings, also called component loadings in principal components analysis, are the correlation coefficients between the variables (rows) and factors (columns). Analogous to Pearson *r*, the squared factor loading is the percentage of variance in that indicator variable explained by the factor. To calculate the percentage of variance in all the variables accounted for by each factor, one adds the sum of the squared factor loadings for that factor (column) and divides by the number of variables. (Note: The number of variables equals the sum of their variances, as the variance of a standardized variable is 1.) This is the same as dividing the factor's eigenvalue by the number of variables.

One rule of thumb for determining factor loadings in confirmatory factor analysis is that loadings should be 0.7 or higher. This is to confirm that independent variables identified a priori are represented by a particular factor, on the rationale that the 0.7 level corresponds to about half of the variance in the indicator being explained by the factor. However, the 0.7 standard is a high one and real-life data may well not meet this criterion. Thus, for exploratory purposes, a lower level such as 0.4 is used for the central factor and 0.25 for other factors, calling loadings above 0.6 "high" and those below 0.4 "low."[7,8]

A scree plot is used to visually describe how many factors should be retained for analysis. Although there is no set number of factors that should be retained for analysis using a scree plot, there are a couple of rules of thumb.[9] One rule is to consider only those factors with eigenvalues over 1. Another rule of thumb is to plot all the eigenvalues in their decreasing order. The plot looks like the side of a mountain, and "scree" refers to the debris fallen from a mountain and lying at its base. Eigenvalues and scree plots are used to show the reader that the clinical instrument described in the current study was actually measuring only 3 factors, and the Emotional Intelligence

I. Patient Assessment and Anesthetic Plan				
1. Consistently performs a thorough preoperative and postoperative evaluation on each patient as appropriate	☐ Above expectations	☐ Meets expectations	☐ Below expectations	☐ Failing
2. Synthesizes a comprehensive care plan for patients in all ASA physical status categories	☐ Above expectations	☐ Meets expectations	☐ Below expectations	☐ Failing
II. Didactic Transference to Clinical Practice				
1. Consistently utilizes critical thinking skills in applying didactic knowledge to clinical cases	☐ Above expectations	☐ Meets expectations	☐ Below expectations	☐ Failing
III. Perianesthetic Management				
1. Uses sound clinical judgment when managing routine, advanced, and emergency cases	☐ Above expectations	☐ Meets expectations	☐ Below expectations	☐ Failing
2. Readily achieves mastery of new skills and procedures	☐ Above expectations	☐ Meets expectations	☐ Below expectations	☐ Failing
3. Synthesizes perioperative data to make safe adjustments in care	☐ Above expectations	☐ Meets expectations	☐ Below expectations	☐ Failing
4. Serves as a resource person for airway and ventilatory management of patients	☐ Above expectations	☐ Meets expectations	☐ Below expectations	☐ Failing
5. Recognizes and appropriately responds to complications that occur in the perioperative period	☐ Above expectations	☐ Meets expectations	☐ Below expectations	☐ Failing
IV. Communication Skills/Professional Role				
1. Demonstrates efficiency	☐ Above expectations	☐ Meets expectations	☐ Below expectations	☐ Failing
2. Validates and critiques own performance	☐ Above expectations	☐ Meets expectations	☐ Below expectations	☐ Failing
3. Independently communicates with all anesthesia, operating room (OR), and surgical personnel	☐ Above expectations	☐ Meets expectations	☐ Below expectations	☐ Failing
4. Treats patients respectfully	☐ Above expectations	☐ Meets expectations	☐ Below expectations	☐ Failing
5. Stress management is appropriate	☐ Above expectations	☐ Meets expectations	☐ Below expectations	☐ Failing
V. Care and Preparation of Equipment				
1. Works within the budgetary and accreditation goals of the OR/anesthesia department	☐ Above expectations	☐ Meets expectations	☐ Below expectations	☐ Failing
2. Identifies and takes appropriate action when confronted with equipment-related malfunctions	☐ Above expectations	☐ Meets expectations	☐ Below expectations	☐ Failing
3. Follows standard precautions for safety and infection control	☐ Above expectations	☐ Meets expectations	☐ Below expectations	☐ Failing
VI. Overall Evaluation in Comparison to Peers	☐ Exceptional	☐ Above expectations	☐ Average	☐ Below expectations

Table 1. Clinical Instrument

concept was actually measuring only 2 factors. The Figure presents a scree plot showing the reader that the clinical instrument was actually measuring only 3 factors.

• ***Correlation.*** Besides the factor analysis of the clinical instrument that revealed 3 clinical factor skills—technical skills, patient-focused concepts, and resource management—the researcher explored the correlations between clinical scores and NCE scores. After Bonferroni correction, no clinical variables were significantly correlated with NCE scores (Table 3).

• ***Regression Analysis.*** A corollary to this study was the hypothesis that clinical scores were predictive of NCE scores. Regression analysis was used to test the hypothesis that clinical scores in the program can gauge success on

Item	Technical skills	Patient-focused concepts	Resource management
Pre/postassessment	0.766	0.103	0.210
Care plan	0.813	0.184	0.153
Didactic transference	0.806	0.192	0.195
Sound clinical judgment	0.709	0.228	0.324
Skill mastery	0.515	0.291	0.368
Data-adjusted care	0.730	0.389	0.185
Resource person	0.347	0.080	0.834
Complication response	0.716	0.249	0.317
Efficiency	0.650	0.465	0.212
Self-validation critique	0.342	0.716	0.228
Communication	0.288	0.721	0.201
Patient respect	0.139	0.753	0.038
Stress management	0.161	0.666	0.123
Budget/accreditation	0.159	0.156	0.888
Equipment	0.401	0.345	0.571
Standard precautions	0.421	0.376	0.416
Peer comparison	0.768	0.434	0.229
Eigenvalue			
Total eigenvalue	8.802	1.334	1.156
Percent of variance explained	32.080	18.640	15.710

Table 2. Factor Loadings for Factor Analysis on Clinical Instrument With Full Scale Score (Rotated Component Matrix)

the NCE. Regression analysis is a useful technique that allows a prediction of outcomes based on known evidence and explains interrelationships among variables.[4,5] The accuracy of the prediction is based on the strength of the correlations between the predictors and the outcome measure.[6] As is standard in educational studies, for tests of significance the .05 probability level was used to reject the null hypotheses. For regressing variables new to the experimental process (eg, clinical factors), the .1 level of significance was used because the consequences of rejecting a true null hypothesis seemed not so serious as to warrant a more stringent confidence level. Multiple regression was completed on clinical scores in predicting NCE scores. After Bonferroni correction, one clinical variable, didactic transference, was predictive of NCE scores.

In looking at clinical variables in predicting NCE scores, one clinical variable was predictive of NCE scores (Table 4) after Bonferroni correction, didactic transfer ($P < .001$). A closer look at the clinical variables predictive of NCE scores and the preadmission variables that predict them seems to indicate that the student's overall GPA is the only item that significantly predicts the clinical variables (Tables 4-7).

As depicted in Table 5, overall GPA is the only statistically significant preadmission variable that is predictive of clinical efficiency ($P < .004$), and it is still significant after Bonferroni correction. As depicted in Table 6, overall GPA is the only statistically significant preadmission variable that is predictive of troubleshooting equipment malfunctions, but it is not significant after Bonferroni correction. As depicted in Table 8, overall GPA is the only statistically significant preadmission variable that is predictive of the technical skills factor, and it is still significant after Bonferroni correction.

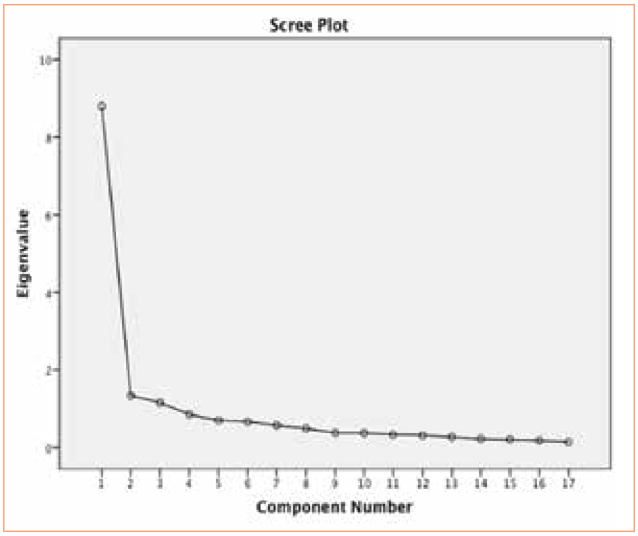

Figure. Scree Plot of Factor Analysis of Clinical Evaluation Tool

Variable	Pearson *r*	Sig. (2-tailed)	n
Acute care experience	0.092	.464	65
Preoperative evaluation	0.145	.250	65
Care plan	0.186	.138	65
Didactic transference	0.192	.126	65
Clinical judgment	−0.236	.058[b]	65
Skill mastery	−0.048	.703	65
Data care adjustment	−0.068	.589	65
Airway resource	−0.144	.251	65
Recognize/respond to complications	0.005	.967	65
Efficient	0.123	.330	65
Valid performance critique	−0.219	.079	65
Independent communication	−0.009	.943	65
Patient respect	−0.089	.483	65
Stress management	0.028	.825	65
Budget	−0.140	.267	65
Equipment malfunction	−0.240	.055[b]	65
Standard precautions	−0.130	.301	65
Peer comparison	0.065	.609	65
Technical skill factor analysis	0.048	.701	65
Patient-focused factor	−0.109	.385	65
Resource management factor	−0.154	.221	65

Table 3. Correlations of National Certification Examination Scores to Clinical Independent Variables[a]

[a] When controlling for type I error buildup (Bonferroni correction), the *P* value has to be less than or equal to .0083.

[b] $P < .05$.

Discussion

• ***Conclusions on Factor Analysis.*** Factor analysis is a crucial tool for validating the structure of instruments. A factor is a group of items that may be said to belong together. A person who scores high in one variable likely will score highly on a variable in the same factor grouping, and vice versa. Such an item has high correlations with other items of the same factor and not so high correlations with items of different factors.[6]

A factor analysis was completed on the clinical evaluation tool subscales (3 factors extracted). A meaningful finding with pragmatic applicability is that the clinical instrument measuring 17 items actually measures only 3 underlying constructs. For the clinical factor analysis, the first factor extracted was the student's ability to perform technical skills related to practice, the second factor extracted was the student's ability to relate to self and others (emotional intelligence concept), and the third factor extracted was the student's ability to be resource conscious. These 3 factors explain 66% of the variance in the clinical instrument.

• ***Clinical Findings.*** For accreditation purposes, the Council on Accreditation of Nurse Anesthesia Educational Programs (COA) requires that SRNAs demonstrate competence in a variety of clinical indicators.[10] To accomplish this, NA schools perform regular clinical evaluations of the student's clinical progress. Previous studies, to the authors' knowledge, have not explored clinical evaluation in relation to academic outcomes.

Although NA programs use different tools for different evaluations, many are similar, as all NA schools must meet the same COA standards for reaccreditation. This study's clinical instrument finding shows that at least 4 NA programs may be measuring only 3 clinical constructs. This finding is consistent with a lack of clinical instrument validity among these 4 NA programs, and is a finding that requires follow-up. Nurse anesthesia programs could learn from other clinical professional training programs (eg, physical therapy) that use a national standardized clinical evaluation instrument.

An interesting finding in this study was the connection between certain clinical components and the NCE. Clinical evaluation findings that were statistically significant in positively predicting NCE scores included the ability to transfer didactic knowledge to the clinical setting ($P < .001$), efficiency ($P < .027$), the ability to troubleshoot equipment ($P < .035$), and the technical skills factor ($P < .050$). Anesthesia simulation may be beneficial in increasing proficiency in these areas.

Cognitive task analysis has been used to train operators of complex systems to develop the cognitive and decision-making skills necessary to manage the chaos of

Variable		b		t		P
Preoperative evaluation		−17.503		−0.944		.350
Care plan		22.285		1.317		.194
Didactic transfer		37.483		3.470		.001[b]
Clinical judgment		−22.186		−1.444		.156
Skill mastery		−20.814		−1.645		.107
Data adjust care		−14.014		−0.873		.387
Recognize and respond to complications		5.796		0.322		.749
Efficient		36.058		2.276		.027[c]
Valid self-critique		−23.849		−1.948		.057
Independent communication		−0.669		−0.058		.954
Patient respect		0.433		0.032		.975
Stress management		− 3.668		−0.303		.763
Budget		25.937		0.699		.488
Equipment malfunction		−33.692		−2.174		.035[c]
Standard precautions		11.218		0.795		.431
Peer comparison		9.536		0.831		.410
Resource management		−16.127		−0.810		.422
Technical skills factor		3.289		1.978		.050[c]
Patient-focused factor		−7.352		−1.563		.123
Resource management factor		−15.655		−1.732		.088
Model	R^2	*Adj* R^2	*df1/2*	FChange	*P*	Significant
	0.478	0.290	17/6	2.534	.006	S

Table 4. Selected Clinical Variables for Predicting National Certification Examination Scores and Corresponding Regression Model[a]

Abbreviations: Adj, adjusted; *df*, degrees of freedom.

[a]Significant variables account for unique variance when controlling for all other variables in the model.The model includes all items listed in the table. When controlling for type I error buildup (Bonferroni correction), the *P* value has to be less than or equal to .0025.

[b] $P < .01$.

[c] $P < .05$.

Variable		b		t		P
Overall GPA		0.925		3.301		.001[b]
Science GPA		−0.116		−0.696		.488
Quantitative GRE		0		−0.595		.553
Verbal GRE		0.001		0.730		.467
Analytical GRE		0.038		0.386		.700
Acute care experience		0.007		0.398		.691
Model	R^2	*Adj* R^2	*df1/2*	FChange	*P*	Significant
	0.118	0.074	6/127	2.694	.017	S

Table 5. Selected Academic Variables for Predicting Didactic Transfer and Corresponding Regression Model[a]

Abbreviations: Adj, adjusted; *df*, degrees of freedom; GPA, grade point average; GRE, Graduate Record Examination.

[a] Significant variables account for unique variance when controlling for all other variables in the model. When controlling for type I error buildup (Bonferroni correction), the *P* value has to be less than or equal to .0083.

[b] $P < .01$.

complex environments,[11,12] such as the operating room environment. It may be that more closely evaluating these clinical criteria as the student progresses through the NA program will help in predicting the student's success on the NCE. In light of the finding in this study that transfer of didactic knowledge predicts NCE scores, it may be that more closely evaluating the clinical criteria as the student progresses through the NA program will help in predicting the student's success on the NCE.

Although there are 4 clinical variables predictive of NCE scores, an important applicable finding in this study is the predictive value of preadmission overall GPA of all 4 clinical factors: the ability to transfer didactic knowledge to the clinical setting ($P < .001$), efficiency ($P < .004$),

Variable		b		t		P
Overall GPA		0.742		2.945		.004[b]
Science GPA		−0.092		−0.615		.540
Quantitative GRE		−0.001		−1.320		.189
Verbal GRE		0.001		0.969		.334
Analytical GRE		0.070		0.794		.429
Acute care experience		0.009		0.559		.577
Model	R^2	*Adj* R^2	*df1/2*	FChange	*P*	Significant
	0.105	0.061	6/127	2.375	.033	S

Table 6. Selected Academic Variables for Predicting Efficiency and Corresponding Regression Model[a]
Abbreviations: Adj, adjusted; *df*, degrees of freedom; GPA, grade point average; GRE, Graduate Record Examination.
[a] Significant variables account for unique variance when controlling for all other variables in the model. When controlling for type I error buildup (Bonferroni correction), the *P* value has to be less than or equal to .0083.
[b] $P < .01$.

Variable		b		t		P
Overall GPA		0.453		2.362		.020[b]
Science GPA		0.070		0.611		.542
Quantitative GRE		0		−0.152		.879
Verbal GRE		0		0.269		.789
Analytical GRE		−0.086		−1.288		.200
Acute care experience		0.004		0.304		.762
Model	R^2	*Adj* R^2	*df1/2*	FChange	*P*	Significant
	0.123	0.079	6/127	2.817	.013	S

Table 7. Selected Academic Variables for Predicting Equipment Malfunction and Corresponding Regression Model[a]
Abbreviations: Adj, adjusted; *df*, degrees of freedom; GPA, grade point average; GRE, Graduate Record Examination.
[a] Significant variables account for unique variance when controlling for all other variables in the model. When controlling for type I error buildup (Bonferroni correction), the *P* value has to be less than or equal to .0083.
[b] $P < .05$.

Variable		b		t		P
Overall GPA		6.116		3.236		.002[b]
Science GPA		−0.179		−0.158		.874
Quantitative GRE		−0.004		−1.012		.314
Verbal GRE		0.003		0.482		.631
Analytical GRE		0.438		0.665		.507
Acute care experience		0.075		0.638		.525
Model	R^2	*Adj* R^2	*df1/2*	FChange	*P*	Significant
	0.132	0.089	6/127	3.079	.008	S

Table 8. Selected Academic Variables for Predicting Technical Skills Factor and Corresponding Regression Model[a]
Abbreviations: Adj, adjusted; *df*, degrees of freedom; GPA, grade point average; GRE, Graduate Record Examination.
[a] Significant variables account for unique variance when controlling for all other variables in the model. When controlling for type I error buildup (Bonferroni correction), the *P* value has to be less than or equal to .0083.
[b] $P < .01$.

the ability to troubleshoot equipment ($P < .020$), and the technical skills factor ($P < .002$). The regression models for overall GPA predicting all 4 of these clinical variables were also statistically significant.

The statistically significant predictive value of overall GPA of these clinical variables and the models (the ability to transfer didactic knowledge to the clinical setting ($P = .017$), efficiency ($P = .033$), the ability to troubleshoot equipment ($P = .013$), and the technical skills factor ($P = .008$) suggests that overall GPA is an important preadmission criterion for NA programs.

• ***Limitations.*** Four limitations of this study can be acknowledged. The first limitation of the study was the cross-sectional design—it provides a snapshot in time vs changes over time in terms of clinical progression. Second, even though the NA programs came from the same geographical region, the similarities of the study populations (which allows for a smaller sample size) served to limit variability in responses. The third limitation of this study is the possible inaccuracy of the cognitive data (GRE, overall GPA, and science GPA). Cognitive data collection varied by institution in responsible personnel and may have contained unanticipated errors. The fourth limitation was that the GPA data could be confounded by the variability in undergraduate nursing education based on the nursing program each student attended. For these reasons, limitations exist regarding analysis of the independent variables for the study.

Conclusion

Factor analysis of the 17-item clinical instrument demonstrated that only 3 constructs were being measured. These constructs can be described as technical skills, patient-focused concepts, and resource management.

A clinical evaluation finding statistically significant in positively predicting NCE scores is the ability to transfer didactic knowledge to the clinical setting ($P < .001$, $r = 0.192$). Although overall GPA is not itself predictive of NCE scores, it is the only preadmission variable that correlated with and predicted NA GPA and the clinical variable (the ability to transfer didactic knowledge to the clinical setting), both of which are predictive of NCE scores.

Direct recommendations for practice resulting from this study include the following:

1. Identify and define the key concepts that need to be measured to document satisfactory clinical performance and progression.
2. Create a clinical evaluation instrument so that it measures the defined constructs.
3. Test any new instrument with a factor analysis for validity purposes.
4. Revise the tool as needed.

When considering evaluation tools, whether it be clinical evaluation or patient-related, we need to ask ourselves what it is we are trying to measure, and then devise and validate those instruments so that we actually measure what we want. If a tool has, for example, 20 items, but actually measures only 3 items, we have a choice to make. Is it acceptable to measure only 3 items, or does instrument revision need to occur so that it measures all the things we are looking for? This study demonstrates that, at the very least, educators should ask themselves these questions, starting with validation of the instruments we currently use to evaluate students.

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