

A Review of a Holistic Assessment System for Hiring Effective Nursing Staff
(SUBMITTED FOR REVIEW)

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Aim: The goal of this paper is to present a critical review of the development and validation of a multidimensional assessment battery designed to assist hiring managers in the process of selecting highly-qualified nursing staff. The assessment battery included three separate tests: (1) clinical (job knowledge), (2) situational judgment, and (3) behavioral/personality. This paper describes the process used, the results, and guidance for healthcare institutions for following similar test development and validation processes. The study involved three test publishers, 492 nurse staff from a Mid-West Healthcare Facility (470 nurses and 22 nurse supervisors), and 384 nurse staff from North-East Healthcare Facility (367 nurses and 17 nurse supervisors).

Background: The nursing profession is changing. With the push toward outcome-based medicine and the imperative of driving healthcare costs down, nurses are being asked to provide more and better care with fewer resources. This can only be accomplished by ensuring that healthcare staff has the knowledge, skill, and personal attributes necessary to perform at the highest levels of quality and efficiency.

Conclusions: The complexity of human behavior precludes the likelihood that any selection instrument or set of instruments will ever be able to make error-free determinations of which potential nurses will be the highest performers. However, it is possible to greatly improve the assessment and selection process with the implementation of valid and reliable tools. Our review indicates that using a diverse set of three assessments (measuring job knowledge, situational judgment, and personality) provides an efficient and effective way to assess the entire nurse rather than simply their ability to interview well. It provides a holistic assessment that exhibited a strong correlation ($r = .67$) to overall job performance, which explains about 45% of the factors that make up nurse job performance.

Implications for Nursing Management: Using multi-faceted selection system that includes tests measuring job knowledge, situational judgment, and personality can result in forming a nursing workforce that will have the highest likelihood of job success.

Keywords: Content validation, nurse hiring, nurse assessments, situational judgment tests, personality testing, criterion-related validation, criterion validation, nurse testing.

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Introduction

The nursing profession is changing (Hall & Donner, 1997). With the push toward outcome-based medicine and the imperative of driving healthcare costs down, nurses are being asked to provide better care with fewer resources. Some hospitals have reorganized around bedside nursing to the extent that they have eliminated nursing support staff such as Certified Nursing Assistants who have traditionally performed many of the more frequently performed tasks such as bathing patients, changing bed linen, and collecting I&O measurements. In addition, many hospitals are in the process of introducing electronic medical records, bedside data entry systems, computerized pharmaceutical dispensing units, and the collection of other outcome and compliance-related data in an electronic format (Abbott, 2012; Caligtan, Carroll, Hurley, Gersch-Zaremski, and Dykes, 2012). Finally, many hospital units are being required to care for patients with conditions that are more acute than those they have typically treated.

These factors, when combined, increase the need to hire highly-qualified nurses with the full-spectrum of knowledge in their field along with the added ability to deal effectively with both people and technology. Identifying and selecting such well-rounded staff places increased pressures on those participating in the hiring process because they themselves grew in their careers through the more traditional model of service provision, without the heavy reliance on technology and strong demand to do more with less.

Maximizing productivity and outcomes in today's healthcare environment requires a greater emphasis on making valid pre-hire assessments of potential nurses that go beyond Board Certification and the knowledge of a particular specialty. It requires ensuring that the nurse has the knowledge required for the job, but also the personality orientation to provide supportive and effective care that facilitates healing and recovery. It also requires that the nurse possesses the sound judgment to rapidly make effective decisions based on available information.

This article presents a review of three assessments that were designed to measure these respective areas. To form an ideal multi-faceted assessment, these three assessments were optimally weighted after conducting statistical research that identified their respective levels of correlation to job performance. The resulting (combined) assessment score had a strong relationship to overall job performance ($r = .67$), which explains about 45% of job performance.

The Uniform Guidelines on Employee Selection Procedures (1978) as well as the Principles for Validation and use of Personnel Procedures (2003) provide the necessary guidance to develop pre-employment testing procedures that are both legally defensible and maximally effective, given the state-of-the-art in human assessment. This article explains some of the steps that were taken to address these criteria while developing these three assessments, and provides suggestions for employers to follow similar steps when developing selection tools.

Purpose

The purpose of this article is to evaluate the effectiveness of three different types of selection tools that are commonly used in the nursing field: clinical (job knowledge) tests, video-based situational judgment tests, and personality tests. The three tests that are reviewed in this study were created over a two year period, beginning in 2010, through a collaboration between The study involved three test publishers, 492 nurse staff from a Mid-West Healthcare Facility (470 nurses and 22 nurse supervisors), and 384 nurse staff from North-East Healthcare Facility (367 nurses and 17 nurse supervisors). Further, the study evaluated how these three tests can be optimally weighted to create a combined assessment score that would be most predictive of job success.

The Assessment Process

The three assessment components were selected for three reasons: (1) they are commonly used in hiring processes for selecting nurses, (2) they measure unique knowledges, skills, abilities, and personal characteristics (KSAPCs), and (3) they can be combined and administered in a 2-3 hour assessment session. Each assessment component is described below:

Clinical Assessments

The Clinical Assessments, which are perhaps the most familiar assessment to hiring managers, consist of tests measuring job-specific knowledge in clinical specialty practice areas such as Labor and Delivery, Medical-Surgical, and Emergency Room. Each test is administered online and typically includes between 30 and 70 multiple-choice questions. A total of 12 clinical practice area tests were included in the study.

These tests are based on a content-validation methodology, which focuses on measuring critical knowledge, skills, and abilities required to perform the job. These were identified based on the professional opinion of qualified subject matter experts (SMEs). Each of these clinical assessments also demonstrated varying degrees of statistically significant correlations with job performance as high as $r = 0.26$ (see results discussion below).

Situational Judgment Assessments

Situational judgment tests (SJTs) have received much attention in the personnel selection literature (e.g., Christian, Edwards, and Bradley, 2010). Some of the key benefits attributed to SJTs include increased testing fidelity and lowered adverse impact (i.e., subgroup differences) in the selection process (Weekley & Jones, 1997). Specifically, when comparing written- and video-based SJTs, the video-based SJTs have been identified as the preferable method for lowering adverse impact because the delivery is context-based and the academic load is minimized (Chan & Schmitt, 1997).

The Situational Assessment component reviewed in this study included 21 video-based scenarios that are 30-120 seconds in length. The videos present the nurse applicant with complex interpersonal situations that occur in hospital environments such as interacting with patients, physicians, and other co-workers. Each video is followed by a set of written response options from which the applicant is asked to select the “most effective” and “least effective” way of handling the situation.

The Situational component was originally validated in two steps. First, a calibration study was conducted at Saint Francis Medical Center in Cape Girardeau, Missouri with the goal being to determine the extent to which the assessment was “criterion valid” (i.e., predictive of job performance). Saint Francis is a 258-bed facility serving more than 650,000 people throughout Missouri, Illinois, Kentucky, Tennessee, and Arkansas. The results of this study were used to make minor changes to the test to improve the predictive power of the assessment.

The second step was a confirmatory study and was conducted at Frederick Memorial Hospital in Frederick, Maryland. Frederick Memorial is a large medical facility that employs 2,700 medical professionals, including 375 doctors and several hundred nurses. This second study was conducted to confirm the validity of the assessment using a completely different sample. Significant correlations to performance were identified in both studies.

Behavioral/Personality Assessments

This assessment included 70 personality/behaviorally-based test items (scored using a Likert-type scale) that are targeted toward measuring Conscientiousness, Tough-Mindedness, Conventional, Extroversion, Stability, Teamwork, and Good Impression. By correlating the various personality scales to the job performance metrics, several scales showed significant correlations.

Measures of Job Performance

To evaluate whether each of these three tests were significantly correlated to job performance, a Job Performance Rating Survey (JPRS) was created that represented 19 unique aspects of nurse job performance (see Table 1). Nurse supervisors used this survey to sort their nurses into ten job performance categories (deciles, with each of the ten categories including 10% of their supervised nurses based on job performance in each of the 19 dimensions). The job performance ratings of nurses who were supervised by more than one manager were averaged. These 19 dimensions served as criteria in the correlation study that included the three assessments.

[INSERT TABLE 1 ABOUT HERE]

One of the compelling findings of this validation study (as revealed by Table 2) was the fact that each of the assessments seemed to target unique aspects of job performance. Only one of the top six job performance dimensions (Conflict Resolution) overlapped with the top six

dimensions predicted by another assessment. This indicates that the three different assessment components are measuring unique aspects of nurse performance.

[INSERT TABLE 2 ABOUT HERE]

By relying on all three components, it appears that a holistic prediction of likely job performance is realized.

Assessment Validation

Validation of the Clinical Assessment

This set of assessments includes 12 unique written, multiple-choice tests that were designed to measure mastery of the job knowledge domains associated with each relevant practice area. These tests were developed using a content validation methodology (Uniform Guidelines, 1978), which included job analysis research for the respective practice area and connecting the test items to the critical knowledge, skill, and ability (KSAs) domains using validation surveys designed for this process.

In addition to using a content validity methodology, the criterion-related (statistical) validity of the assessment was also evaluated. The statistical analysis process began by restricting the data pairs used in the study (i.e., job performance ratings and matching clinical test scores) to the clinical tests that were directly related to each nurse's relevant practice area (e.g., Medical-Surgical, Labor and Delivery) so that a tight connection could be made between the test and the job practice area for the analyses. This step was completed using a 1-3 rating (low, moderate, high) indicating the relevancy of the test to the practice area. Only the clinical tests receiving a rating of three (high) in relation to the nurse's practice area were retained for further analysis. After this step, the Clinical Assessments were standard scored by test (to preserve each test's specific mean and variance for the subsequent analyses) for making common comparisons.

The resulting dataset was used to evaluate the correlations between the 19 job performance dimensions and standardized Clinical Assessment test scores. The results are displayed in Table 3.

[INSERT TABLE 3 ABOUT HERE]

While the Clinical Assessments were based on a foundation of content validity, the supplemental statistical validity analyses conducted as part of this research revealed that they exhibit varying levels of correlation when combined. When broken down by individual test/practice area at each location, the correlation results (as expected) vary.

While the results in Table 3 show that the effect of a written job knowledge test, overall, had a correlation with job performance (across all functional areas, aggregated), they do not, however, provide generalizability evidence (i.e., that such tests will always be valid in similar

situations, in this study or others). Rather, a strong content validity nexus should exist between the specific written test and functional area where the test is being used. Nonetheless, when combined, the tests show various degrees of statistically significant correlations to job performance, with notably higher correlations in the areas that would be expected from job knowledge mastery tests (e.g., the parts of the job requiring Critical Thinking and Problem Solving).

Validation of the Situational Judgment

Based on a thorough analysis of the nursing profession conducted at four medical centers and healthcare employment centers, a total of 19 core competencies and 22 associated KSAs was identified as being important to nurse job performance. These are outlined in Table 1 (these core competencies also served as the job performance dimensions included in the study).

A panel of 12 Job Experts from Saint Francis Medical Center in (incumbent registered nurses and supervisory-registered nurses) representing several clinical work areas (e.g., emergency room, intensive care, labor and delivery, cardiac/telemetry, medical surgical, nurse educators) was convened. These experts reviewed the critical competencies and identified critical incidents, which exemplified both excellent and poor performance. A total of 30 short vignettes were then crafted into scenarios for use the video-based situational judgment assessment. All scenarios were designed to measure an applicant's ability to appropriately respond to situations that nurses might typically encounter starting the first day of the job.

The 30 vignettes were filmed in January 2009 at a medical facility¹ that had state-of-the-art medical equipment in a hospital-style setting. A combination of medical professionals (i.e., nurses and nurse supervisors), patients, and actors were used to portray nurses, doctors, and others during the filming.

Motowidlo and Beier (2010) suggest that when job experts with who have actually performed the job are actively involved in establishing the scoring process, test scores are more related to job performance. The study utilized 50 such experts who reviewed the video vignettes and rated each of the four response alternatives as either "Most Appropriate," "Second Most Appropriate," "Third Most Appropriate," or "Least Appropriate."

After analyzing the expert responses, a multi-point keying rubric was developed that awarded the most points to applicants who agree with "high-rater consensus" alternatives, fewer points to "moderate agreement" alternatives, and even fewer points to "majority disagreement" alternatives. This design also penalized applicants who select a "high consensus-best choice" as the "least effective" choice, or vice versa.

¹ The Sutter Center for Health Professions (SCHP) in Sacramento, California. SCHP is a partnership between the Sutter Health Sacramento Sierra Region and the Los Rios Community College District, which offers an accredited, associates' degree nursing program. The facility was chosen because of the state-of-the-art medical equipment in a hospital-style setting.

Validation of the Behavioral Assessment

To build an abbreviated scale from a subset of the 70 behavioral/personality items that demonstrated the strongest correlation to job performance, a final “Nurse Effectiveness Scale” was developed. The process was completed by evaluating the correlations with job performance at the test item-level using a split-half/hold-out validation study design. The resulting correlations exhibited strong relationships with job performance in the range of $r = 0.20$ s to $r = 0.30$ in areas such as Honest and Conscientious (work practices), Accountability, and Delegating/Managing Patient Care.

Composite Scoring

The three assessments were combined into an overall composite score by determining optimal weights (Clinical: 26.4%; Situational: 32.9%; and Behavioral: 40.7%) using Structural Equation Modeling (SEM).² After combining the three tests using these optimal weights, the observed validity coefficient is very strong ($r = 0.38$). After correcting for unreliability in the job performance ratings and indirect range restriction (because the nurses in the study were selected using other tests), this resulting validity coefficient is $r = .67$, which constitutes an exceptionally strong relationship with job performance (Sackett, Lievens, Berry, & Landers, 2007).

Such a correlation explains about 45% of job performance (determined by simply squaring the .67 coefficient). In other words, about 45% of the variation in a nurse’s job performance appears to be explained by the combined set of assessments. As displayed in Table 4, correlations that exceed .35 are classified as “very beneficial” by the U.S. Department of Labor (U.S. DOL, 2000).

[INSERT TABLE 4 ABOUT HERE]

In addition, when weighing the credibility of validity studies in legal settings, some courts have ruled that correlations exceeding $r = 0.30$ surpass the threshold required for justifying the use of tests on a strict, rank-ordered basis (see Biddle, 2011).

When these validity results are evaluated using tables that are frequently used by personnel psychologists for evaluating the practical benefits from using validated assessments (Taylor & Russell, 1939), the results reveal that using the assessment is likely to substantially improve the effectiveness of a nurse hiring program. The next section provides a few specific examples.

Practical Outcomes of Using a Validated Test Composite

² AMOS Version 19, published by SPSS (IBM) was used for this part of the study.

The validity coefficient (i.e., correlation between test performance and job performance) of a test can be used for modeling hiring scenarios that will have different outcomes in the resulting workforce. Modeling such scenarios requires making various assumptions regarding two factors, the *Base Rate* and the *Selection Ratio*. The Base Rate refers to the percentage of the applicant pool that is qualified at the desired level (e.g., those who would receive “average” job performance ratings). Some hiring pools may have high Base Rates, where (for example) 80% of the nurse applicants are adequately qualified. In other situations, this proportion may be lower, where only half (50%) of the nurse applicants are qualified. The Selection Ratio simply refers to the percentage of nurse applicants who will be tested and subsequently hired. For example, a 50% Selection Ratio indicates that one-half of the nurse applicants who are tested will be subsequently hired.

[INSERT TABLE 5 ABOUT HERE]

Table 5 demonstrates the likelihood of hiring a nurse who will subsequently be rated “average or above-average” on the job when compared to not using the combined assessment score. For example, assuming an 80% Base Rate and 50% Selection Ratio 95% of the hired group will likely meet or exceed job performance expectations (see Table 5). This constitutes a 15% direct benefit attributable to using the combined assessments (95% - 80% = 15%).

In addition to improving the job performance levels of the incoming nursing staff, substantial financial gains can also be realized by using validated assessments. For example, using an assessment battery with strong validity (e.g., $r = .67$) and assuming a 70% Base Rate and 40% Selection Ratio, a medical facility that screens 500 applicants (and hires the top 200) will realize \$8,842,365 in value over the expected tenure of the newly hired staff (assuming 5.3 average tenure, a financial value of \$10,000 associated with one standard deviation of job performance, \$70,000 annual salary, and testing cost of \$150 per applicant) (Cascio & Boudreau, 2010). This equates to about \$8,342 added value for each new hire.

Conclusion and Discussion

This study reveals the ideal selection process for screening nurses should be multi-faceted, including (at a minimum) tools for measuring the job knowledge, situational, and personality-based competencies of the incoming nursing staff. Such a combined assessment appears to hold significant promise for those healthcare providers who are seeking to increase the quality of care and productivity of their workforce. Using a robust selection battery of this nature is likely to result in improvement across all key 19 performance dimension evaluated in this study (see Table 2).

An additional benefit of hiring a greater proportion of high performing nurses is the potential for having a greater talent pool for developing tomorrow’s leaders. This is important when considering the aging of the workforce and the fact that many of the most highly experienced and tenured nurses are approaching retirement age.

Implications for Nursing Management

In conclusion, using a multi-faceted assessment process represents a significant advancement in the application of science to creating a way to rapidly and efficiently identify those nurse applicants who are most likely to be average/above average performers. The multi-dimensional assessments described in this review help to measure the depth and breadth of a nurse's knowledge of their respective specialty as well as their ability to apply effective judgment, and the extent to which their personality provides a sound basis for a team-oriented, caring, and effective healing environment.

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Tables

Table 1. Key Competencies Selected for Situational Judgment Assessment Design and the Job Performance Rating Survey (JPRS)

Honest & Conscientious	Problem Solving
Verbal Communication	Patient Care (calm & competent)
Administering Medications	Report Transitioning
Assertiveness	Continuous Observation
Change Adaptation	Developing Patient Relationships
Conflict Resolution	Patient Care Plan Management
Accountability	Patient Customer Service
Critical Thinking	New Technique Application
Multitasking	Delegating/Managing Patient Care
Following Clinician Instructions	

Table 2. Top Six Ranked Performance Dimensions Predicted by Each Assessment¹

Written Test	Situational Assessment	Personality Scale
Administering Medications	Patient Care (Calm & Competent)	Accountability
Problem Solving	Developing Patient Relationships	Honest & Conscientious
Report Transitioning	Verbal Communication	Conflict Resolution
Critical Thinking	Patient Customer Service	New Technique Application
Multitasking	Patient Care Plan Management	Delegating/Managing Patient Care
Assertiveness	Conflict Resolution	Change Adaptation

1. *The values in this table are based on the total amount of criteria variance predicted (explained) by the set of three assessments (summed), not the total variance available.*

Table 3. Observed and Estimated Correlations for Clinical Assessments at both Hospitals (all tests combined).

Job Performance Dimension	Saint Francis Medical Center			Frederick Memorial Hospital			Combined ⁽¹⁾	
	N	R	p-value	N	r	p-value	Average	Est. r ⁽²⁾
Average Criterion Rating	467	0.203	0.000	367	0.137	0.004	0.174	0.208
Honest & Conscientious	467	0.094	0.021	365	0.063	0.116	0.080	0.104
Verbal Communication	468	0.123	0.004	363	0.148	0.002	0.134	0.186
Administering Medications	454	0.194	0.000	358	0.131	0.007	0.166	0.243
Assertiveness	470	0.208	0.000	367	0.107	0.021	0.164	0.218
Change Adaptation	462	0.093	0.023	353	0.046	0.195	0.073	0.116
Conflict Resolution	468	0.070	0.066	363	0.105	0.022	0.085	0.124
Accountability	467	0.110	0.008	364	0.068	0.098	0.092	0.144
Critical Thinking	466	0.249	0.000	362	0.144	0.003	0.203	0.265
Multitasking	470	0.218	0.000	367	0.111	0.017	0.171	0.225
Following Clinician Instructions	460	0.210	0.000	360	0.137	0.005	0.178	0.241
Problem Solving	470	0.260	0.000	367	0.094	0.036	0.187	0.238
Patient Care (calm & competent)	468	0.161	0.000	365	0.098	0.030	0.133	0.183
Report Transitioning	467	0.223	0.000	359	0.108	0.020	0.173	0.222
Continuous Observation	470	0.155	0.000	357	0.077	0.073	0.121	0.155
Developing Patient Relationships	470	0.129	0.003	357	0.147	0.003	0.137	0.178
Patient Care Plan Management	459	0.168	0.000	356	0.150	0.002	0.160	0.215
Patient Customer Service	466	0.126	0.003	358	0.161	0.001	0.141	0.203
New Technique Application	466	0.163	0.000	366	0.168	0.001	0.165	0.232
Delegating/Managing Patient Care	468	0.133	0.002	363	0.125	0.008	0.130	0.180

(1) Weighted by sample size.

(2) Validities corrected for rater unreliability using the Intra-Class Correlation Coefficient values from the Saint Francis Medical Center study.

Table 4. Top U.S. Department of Labor Guidelines for Interpreting Validity Coefficients.

Coefficient Value	Interpretation	Percentage of Job Performance Explained
Above .35	Very beneficial	12.3%+
.21 - .35	Likely to be useful	4.4% - 12.3%
.11 - .20	Depends on circumstances	1.2% - 4%
Below .11	Unlikely to be useful	<1.2%

Source: U.S. Department of Labor (2000), Testing and Assessment: An Employer's Guide to Good Practices (p. 3-10)

Table 5. Forecasted Nurse Hiring Outcomes Based on Using the Combined Assessments.

Forecasted Nurse Hiring Outcomes Based on Using Prophecy Assessments										
Combined Test T-Score	Selection Ratio	Base Rate (% of test takers who would likely receive "Average+" job performance ratings)								
		10%	20%	30%	40%	50%	60%	70%	80%	90%
<67.2	100%	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0
67.2	90%	11.1	22.2	33.2	44.1	54.8	65.3	75.5	85.1	93.8
71.6	80%	12.4	24.7	36.7	48.3	59.5	70.1	79.8	88.6	95.8
74.8	70%	14.1	27.6	40.6	52.8	64.1	74.4	83.6	91.3	97.1
77.5	60%	16.1	31.1	44.5	57.5	68.7	78.6	86.8	93.4	98.0
80.0	50%	18.7	35.2	49.8	62.5	73.4	82.5	89.8	95.2	98.7
82.5	40%	22.0	40.1	55.3	67.8	78.1	86.2	92.4	96.6	99.2
85.2	30%	26.5	46.2	61.7	73.7	82.9	89.7	94.7	97.8	100
88.4	20%	33.1	54.3	69.4	80.2	87.9	93.3	96.7	98.8	100
92.8	10%	44.3	66.1	79.4	87.9	93.3	96.6	98.5	100	100

¹ T-scores were set with a Mean of 80 and Standard Deviation of 10.