Letter to the Editor

Relationship between Theory and Workplace-based Assessment Scores in Medical Knowledge within a National Psychiatry Residency Programme

Dear Editor,

To date, previous reports have generally reported low-to-moderate correlation between standardised examination results such as In-Training Examination (ITE) scores and clinical evaluations by faculty in disciplines such as internal medicine and surgery.[1-5] However, there is no data on the relationship between objective ITE scores and subjective workplace-based assessments (WBAs) by faculty in psychiatry training programmes especially within Asia. In view of the limited extant data for psychiatry residency, we aimed to: firstly, examine the progression of Psychiatry Residency ITE (PRITE) scores and the workplace-based clinical performance ratings specifically concerning medical knowledge across residency years; and secondly, understand the inter-relationships between PRITE and the same WBAs within our cohort of psychiatry residents. We hypothesised that there would be progression of PRITE and WBA scores with seniority of residency.

Materials and Methods

This is a retrospective cohort study in which we assessed data of 36 psychiatry residents from 3 separate cohorts over a 6-year period. There were 9 residents in the 2010 cohort, 12 residents in the 2011 cohort, and 15 residents in the 2012 cohort. Twenty-three residents were males (63.9%) and 13 residents were females (36.1%). The residents were part of the 5-year National Psychiatry Residency Programme in Singapore and the study protocol was approved by the Institutional Review Boards of the Institute of Mental Health and the National Healthcare Group.

The PRITE which is administered and scored by The American College of Psychiatrists assesses 13 core areas in psychiatry and is taken annually by residents between years 2 to 4. In this study, the standardised score with a mean of 500 and standard deviation (SD) of 100 provided by The American College of Psychiatrists was used in the analysis to allow comparisons across cohorts.

For WBAs, we extracted 4 questions that were used to evaluate the competency of medical knowledge in the Resident Performance Evaluation which is performed quarterly, namely: 1) resident's demonstration of good basic science knowledge, 2) ability to apply medical knowledge in clinical context, 3) demonstration of up-to-date knowledge and, 4) good analytical thinking and problem solving techniques. Each question is rated on a 9-point performance scale (1-3: unsatisfactory, 4-6: satisfactory, and, 7-9: superior). For each resident, composite scores for each year of their training were calculated firstly by averaging the ratings on the 4 questions at each assessment period, then averaging the scores over an academic year. Residents were also rated by their supervisors using the Observer-Reporter-Interpreter-Manager-Expert (ORIME) framework, an adaptation of the Reporter-Interpreter-Manager-Expert (RIME) framework developed by Pangaro.[6] For each resident, the proportion of Manager/Educator ratings across all assessment periods over an academic year was included in this study as an indicator of overall clinical competency with a range from 0 to 1.

In terms of data analysis, we examined whether there is a difference in: 1) PRITE scores, 2) medical knowledge ratings, and 3) ORIME ratings by residency year. The assessment scores and ratings were fitted using linear-effect mixed model, and likelihood ratio test was used to find out whether residency year could predict assessment scores and ratings. Finally, Tukey pairwise comparisons were conducted to compare the difference in assessment scores across the residency years.

Results

Of note, residency year was a good predictor of medical knowledge ratings (P <0.001) and ORIME ratings by supervisors (P <0.001) (Table 1). Tukey pairwise comparisons found that medical knowledge ratings by supervisors were significantly higher for residents in year 3 than year 2 (P <0.001, 95% CI (confidence interval) [0.16, 0.79]), and higher for residents in year 4 than year 2 (P <0.001, 95% CI [0.18, 0.83]). For ORIME ratings, Tukey pairwise comparisons also found that ORIME ratings by supervisors were higher for residents in year 3 than year 2 (P <0.001, 95% CI [0.13, 0.41]) and higher for residents in year 4 than year 2 (P <0.001, 95% CI [0.26, 0.56]). Residency year of training was not a significant predictor of PRITE scores.

Correlation analyses (Table 2) found that medical knowledge ratings by supervisors were positively correlated

Table 1. Summary of PRITE, Medical Knowledge and ORIME Resident Scores by Residency Year

Year	PRITE Scores			Likelihood Ratio Test		Medical Knowledge Ratings			Likelihood Ratio Test		ORIME Ratings			Likelihood Ratio Test	
	n	Mean	SD	X^2	*P* Value	n	Mean	SD	X^2	*P* Value	n	Mean	SD	X^2	*P* Value
2	35	540.26	77.13	2.11	0.35	35	6.82	0.52	859.34	<0.001	35	0.2	0.21	990.93	<0.001
3	29	551.45	66.72			32	7.3	0.59			32	0.47	0.5		
4	27	560.85	57.22			28	7.33	0.53			28	0.62	0.55		

n: sample size; ORIME: Observer-Reporter-Interpreter-Manager-Educator; PRITE: Psychiatry Residency In-Training Examination; SD: Standard deviation

Table 2. Correlations between WBA Scores (Medical Knowledge & ORIME Ratings) and Standardised Examination (PRITE) Scores

Year	PRITE Scores and Medical Knowledge Ratings			PRITE Scores and ORIME Ratings			Medical Knowledge and ORIME Ratings		
	r	95% CI	*P* Value	r	95% CI	*P* Value	r	95% CI	*P* Value
2	0.40	[0.04, 0.66]	0.03	0.25	[-0.09, 0.55]	0.14	0.41	[0.02, 0.64]	0.04
3	0.19	[-0.31, 0.43]	0.61	0.04	[-0.43, 0.39]	0.73	0.43	[0.11, 0.70]	0.01
4	-0.02	[-0.38, 0.35]	0.73	0.02	[-0.38, 0.35]	0.73	0.32	[-0.10, 0.65]	0.13

CI: Confidence interval; ORIME: Observer-Reporter-Interpreter-Manager-Educator; PRITE: Psychiatry Residency In-Training Examination; WBA: Workplace-based assessment; r: Correlation coefficient

with standardised PRITE scores only in residency year 2 (r (34) = 0.40, *P* = 0.03, 95% CI [0.04, 0.66]). However, medical knowledge ratings and ORIME ratings by supervisors were positively correlated with each other both in residency year 2 (r (34) = 0.41, *P* = 0.04, 95% CI [0.02, 0.64]) and year 3 (r (34) = 0.43, *P* = 0.01, 95% CI [0.11, 0.70]).

Discussion

There were several findings in this study. Firstly, workplace-based assessment ratings involving medical knowledge ratings and ORIME ratings by supervisors significantly increased over time when comparing residents in years 3 and 4 to residents in year 2. Secondly, significant positive correlation between PRITE and medical knowledge scores were found only in year 2 residents. Thirdly, significant correlations between the WBA scores by supervisors (medical knowledge and ORIME) were found among residents in years 2 and 3.

Observed improvements in clinical evaluations of the domains of medical knowledge and overall clinical competency may reflect progress in application of medical knowledge in clinical scenarios over time. In the context of constructivism[7] and situated cognition[8] theories, learning is constructed from the learner's experience and medical knowledge is imbued with clinical meaning when the resident applies the theoretical information in his/her specific clinical encounters. The clinical experience in turn consolidates the medical information acquired which can then be applied to a different clinical encounter iteratively. The lack of difference in PRITE scores across years—in contrast to a study by Ryan et al[9] of residents in an emergency medicine programme—may be explained by our relatively small yearly cohort, or a focus on specific knowledge within clinical contexts in senior residency years. This could also reflect the ceiling effect of consistent above-average scores achieved by a self-selected and motivated group of residents within a national training programme with competitive entry and who are self-directed to take responsibility for their learning decisions.[10]

There was only weak-to-moderate correlation between PRITE and medical knowledge scores in year 2 which is consistent with earlier studies showing similar poor correlation although involving residents in other disciplines such as internal medicine, paediatrics, orthopaedic surgery and general surgery.[1-5,11] This may reflect the different nature and construct of assessments involved in standardised examinations such as PRITE, which evaluates a broad and general knowledge base compared with WBAs which evaluates specific clinical skills within different learning environments. WBAs may involve an overall clinical impression related to the reviewed case and the faculty may focus on medical knowledge within specific clinical contexts and not necessarily the broad scope of medical knowledge during their evaluations.[12,13]

In addition, there was observed correlation between WBAs of specific competency of medical knowledge and overall clinical performance in both years 2 and 3 in our study which suggests concordance in these constructs in evaluating medical knowledge over time. These assessments

may be helpful in looking into the impact of medical knowledge on overall clinical performance in earlier training years when there is a steeper learning curve. One major limitation of this study is the lack of local data on the predictive validity of PRITE and WBAs. Future efforts should focus on aligning the PRITE with the context of practice, evaluating the predictive validity of PRITE and WBAs for performance at summative examinations within the training programme, continual training of faculty in the administration and interpretation of these assessments and determination of the inter-rater reliability of these measures.

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