Volume : 2 | Issue : 3 | March 2013 • ISSN No 2277 - 8160

Research Paper | Medical Science

Verbal and Numerical Aptitude of Graduate Nursing Students At Entry Level.

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ABSTRACT

Nurses apply numerical skills for various functions e.g. drug/fluid calculations, estimation of traction weight, nutritional requirement estimations, estimation of incidence and prevalence in epidemiological surveys etc. Nurses are involved in emergency care and handle a variety of written and verbal orders in relation to patient care by health care providers. The review of literature and clinical experience are suggestive of the essentiality of computational and vocabulary skills. This article presents the entry level verbal and arithmetic abilities of Indian graduate nursing students and suggests recommendation for consideration of these skills at entry level.

KEYWORDS: Math aptitude, verbal aptitude, B. Sc. Nursing programme

Introduction:

Nursing was chosen as a vocation by service minded young ladies a century ago and it was the preferred career choice by young men and women a decade (2000-2010) ago. There is a significant growth in the number of nursing educational institutions and the number of nurses in India, however India still needs nurses.1

An important function of nurse is education and counseling. To function effectively as educators and counsellors, nurses require good communication skills especially verbal ability. Nurses communicate knowledge and thus are expected to transmit information and transform people under their care. Ineffective communication results in poor nurse patient communication.

Nurses apply numerical skills for various functions e.g. drug/fluid calculations, estimation of traction weight, nutritional requirement estimations, estimation of incidence and prevalence in epidemiological surveys etc. Nurses are involved in emergency care and handle a variety of written and verbal orders in relation to patient care by health care providers. A study by Ashby reported that medical surgical nurses with 13 to 15 years of clinical practice had the highest scores in the Bayne-Bindler Medication Calculation test whereas with 1-3 years of experience had the lowest. A study by Newton et al reported that as math aptitude decreased, the number of attempts to pass the medication calculation assessment increased.2

Math aptitude was a factor associated with completing a nursing program. Newton et al. discuss that students would also need to be assessed for their reading comprehension and understanding of the English language. When a student is unable to read a question correctly and or does not understand what needs to be extracted from it, then the likelihood of successfully performing a medication calculation decreases dramatically. Thus it is essential that nursing students possess numeric and verbal ability. Assessing these abilities at the entry level may help administrators to plan additional training programmes for those with poor abilities.

A test tool with eight items which required simple ratio and multiplication skills with regard to medication calculation and nutritional estimates among staff nurses (n=58) showed an average score of 3.74 (±1.702). These items were in a statement form and thus the researcher was unclear whether the obtained scores were influenced by reading comprehension or true numerical ability.

This article describes the verbal and numerical aptitude of graduate nursing students of a selected University in South Canara district of Karnataka, upon admission.

Methodology: The study was approved by Institutional Research Committee of Manipal University. Of the 23 nursing colleges in South Canara District, one of the colleges was randomly selected (chit method) for this study. The permission to conduct the study was obtained from the Principal of the nursing institute and informed consent was obtained from the 92 participants, who were on the fourth day of their admission to the nursing programme.

The participants were seated three feet apart and calculators were not permitted. The tests were administered as per guidelines and time was monitored by an assistant.

The tool is a part of the revised David's Battery of Differential Abilities, available from Psycom services. Verbal ability test had two parts. Part 1: vocabulary (15 items for 4 minutes) and Part II: Understanding proverbs (9 items for 3 min and 30 sec). Verbal ability was expected to figure success in school related and academic performances. It is a predictor of occupations involving reading and writing of reports and so on. This ability is assessed by taking the sum of a person's score in Part 1 and 2.

Numerical ability is a predictor of occupations involving computational skills. It had 20 items involving the tasks of addition, subtraction, division, multiplication, squaring, dealing with fractions etc. and was administered for 5 min and 30 sec.

The reported reliability of numerical ability was 0.82 (split half) and 0.79 (test-retest) and of verbal ability test was o.72 (Split half) and 0.79 (test retest). No correction for guessing was made for both the tests. Each item was assigned a score of one. The norms for interpretation gender and age wise were used for analysis.3

Results: The sample characteristics are described in table 1. Participants were unmarried females, with science background in their pre-university education programme. Of the 92 participants, 75 (81.5%) wanted to become a nurse (5 non responders to this item). Of the 75 who wanted to become a nurse, 65 were rural residents (Of the 5 non responders 2 were rural).

The factors which influenced the choice of nursing career were: Job opportunity abroad (78.3%); interest to help others (70.7%); interest to be in medical field (47.8%); job opportunity in India (29.3%); financial problems (26.1%); influence from nurses in the family (18.5%); as a ca-

reer to actualize self (16.3%); career guidance programme (13%) and parents' influence (10.9%).

Table 1: The sample characteristics (n=92)

Characteristics	f	%
Age in years: 17 18 20	28 63 01	30.4 68.5 1.1
Religion: Hindu Muslim Christian Buddhist	14 01 74 03	15.2 1.1 80.4 3.3
Residence: Rural Urban	77 15	83.7 16.3

The mean and standard deviation of the obtained scores are presented in table 2. The raw scores were transformed into STEN (Standard ten) equivalent scores as per the manual and the distribution of STEN scores is presented in table 3.

Table 2: Description of obtained STEN verbal and numerical ability scores (n=92)

Ability	Min score	Max score	Mean	SD
Verbal Ability Part 1	0	7	3.3	1.64
Verbal Ability Part II	0	6	2.72	1.79
Verbal Ability Part I & II	1	13	5.84	2.48
Numerical Ability	3	16	7.99	2.75

A STEN score of 9 and 10 are good predictors of success involving that particular ability. The Sten scores of 1-3 were categorized into poor, 4-7 as average and 8-10 as good as per the author guidelines. Three students who were good in numerical ability, were rural residents, of whom two had poor verbal ability.

Table 3: Verbal and numerical ability of B. Sc. Nursing students (n=92)

Verbal ability		Numerical ability			
Poor		Average	Good	Total	
Poor	Frequency (% of total)	44 (47.8%)	27 (29.3%)	2 (2.2%)	73 (79.3%)
Average	Frequency (% of total)	4 (4.3%)	14 (15.2%)	1 (1.1%)	19 (20.7%)
Total	Frequency (% of total)	48 (52.1%)	41 (44.6%)	03 (3.3%)	92 (100%)

Chi-square test revealed significant association between verbal and numerical ability scores (Exact P= 0.012).

Discussion: Nursing is an evolving profession. Technology equipped health care today focuses on quality orientation. Nursing students of today enjoy sparing their cognitive computational skills by using mechanical computational devices such as calculators or computers.

Newton argues that nursing graduates to have the holistic knowledge necessary for safe and efficient nursing practice, must have not only math aptitude but also the ability to read at the level demanded by the clinical questions being posed. However the study on the contrary found that majority of students (79.3%) possessed poor verbal ability though half of the participants had average numerical ability.2, 4

English is taught as a subject in the first year of graduate nursing programme5and Indian nursing council recommends to teach nursing programmes in English. The study finding indicates that nursing students might be finding it difficult to comprehend the basic sciences taught in the first year nursing programme. The findings support the observation on number of failures in the first year of nursing compared to subsequent years of study, in most of the Indian nursing institutions. The trainers of nursing programme need to plan their lessons in simple language to aid better comprehension by students.

Newton et al report that math aptitude is the predictor of academic success; however they also insist on assessment of reading comprehension ability to identify whether the math proficiency is related to conceptual/contextual factors or are purely mathematical. Newton's study found a moderately strong correlation ($r = 0.351$ $p< 0.001$) between passing medication calculation assessment and reading aptitude, however English aptitude was not related to passing the medication calculation assessment test. The numerical ability test used in this study had no much demands on reading comprehension, as the items printed the symbols for mathematical operations and were self explanatory. Thus the test assessed purely computational ability and not contextual factors. 4

The eligibility criteria for graduate nursing programme in India include physical fitness and a score of a minimum 50% (45% for SC/ST) in English, Physics, Chemistry and Biology subjects of pre university course. Diploma nursing programmes used to admit interested entrants with arts, commerce or science background till 2012, however since the year 2013, science background is made mandatory.

Multiple regression analysis used in a chilean study on medical students showed that the parameters with better predictive value were high school grades, biology test and mathematics academic aptitude test. Verbal academic aptitude test did not have a predictive value. A study can be planned to correlate verbal ability of nursing students with academic success in Indian setting7

The literacy trend in India is changing, moreover India is gaining momentum as a centre of medical tourism and is a market for nurses abroad, thus good verbal ability of Indian nurses is a felt need. Thus from future perspective, verbal ability of nurses should be improved and there is a scope to study the growth of verbal ability since admission to completion of nursing programme.

The pre requisite skills of nursing are not assessed in India including, the mathematical ability. Mathematics or statistics scores of pre university programme are not valued during admission to nursing course wherein biology and English scores are. Possibly this is an area requiring a look by the Indian Nursing Council, considering the essentiality of numerical skills in nursing and to introduce computational skill assessment for therapeutic interventions as a mandatory requirement to proceed for second year nursing programme. Further studies are required to identify the other essential abilities for nursing in Indian context. 6

The factors which influenced the nursing career choice were similar to a study by the researcher. The job opportunity attracted young men and women. Whatever could be the influencing factor for choice of career, to function effectively in a career, one need to possess a few pre requisite abilities, which can be enhanced through training.

The nation is focussing on nurses to be effective health care providers. To be in pace with the goals of correcting growing imbalances in illness wellness patterns, nurses need to be equipped with effective and efficient nursing skills. Thus nursing organizations should identify right candidates upon admission to nursing programmes and mould them as effective nurses. Less time taken for shaping these nurses will certainly contribute in greater folds to the nation in alleviating preventable disease load.

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