

# **Scientific Reasoning and Quantitative Literacy Competency Assessment Plan**

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**Institution: University of Virginia – School of Nursing**

## **Standards/Definition of Scientific and Quantitative Reasoning Competency**

The University of Virginia's School of Nursing proposes to assess its students' knowledge and skills in the areas of scientific and quantitative reasoning together because both are very closely related in the curriculum of the School. The School of Nursing expects its graduates to have mastered essential fundamental knowledge in scientific and quantitative reasoning in preparatory coursework and in clinical application of professional nursing practice. Specifically, the School of Nursing expects its graduates to know and be able to accomplish the following:

- Apply statistics to evaluate current literature.
- Apply quantitative reasoning to evaluate epidemiologic and genetic risk analysis.
- Apply scientific and quantitative reasoning to the analysis of graphs (example dissociation curves, risk curves).
- Use complex mathematical formulas (ex. fluid and electrolyte and acid base problems, arterial blood gas interpretation).
- Interpret tables of physiologic and pathophysiologic data.
- Use scientific reasoning to interpret complex pathophysiologic processes and deduce how these processes will be manifested clinically.
- Use practical mathematics to calculate and verify medication dosages.
- Use practical mathematics for weight based protocols for children.
- Use practical mathematics to determine IV titration and administration pump programming.
- Use practical mathematics to implement and verify anticoagulant and insulin protocols.
- Use practical mathematics to determine Vasopressor drips.
- Use practical mathematics on drug calculations prior to administering them in the clinical area.

## **Description of Measure to be used**

The undergraduate Nursing program is built upon solid foundations of natural science and quantitative reasoning. Twelve general education credits are required in science. All students must take one semester of general biology and two semesters of anatomy and physiology. Many students round out these requirements with a course in

statistics. School of Nursing courses that emphasize scientific and quantitative reasoning include Pathophysiology, Pharmacology, Clinical and Interactive Skills, Lifespan development, Nutrition, Common, Chronic and Complex Illness, Community Health, Pediatrics, Children and Families, and Foundations of Research. The nursing diagnostic reasoning process is used as an organizing principle for teaching. It is derived from general scientific and quantitative reasoning and incorporates assessment, diagnosis, planning, intervention, and evaluation. It is viewed as a constant spiraling way of thinking that adjusts to constantly changing factors in the clinical setting.

The School of Nursing proposes to assess student competency in scientific and quantitative reasoning by using the results of two national tests, which all graduates of the School are required to take annually. The first is the secured version of the Mosby Assesstest, which is a diagnostic readiness and practice test for the professional nursing licensure exam. The second is the National Council Licensure Examination (NCLEX), which is required prior to licensure for practice as a registered nurse.

The School of Nursing has been using the Mosby Assesstest as a diagnostic and program assessment tool since 1988, and the NCLEX exam has governed licensure since the school's founding. The School reviews the results annually and conducts comprehensive reviews of its curriculum in response to the data. The School believes that the results of these two tests are the most effective measures available of the achievement of its graduates in the competencies identified above.

The Assesstest test plan parallels that of the licensure exam and provides each student with extensive feedback about individual performance as well as summarized data about aggregate performance for the institution. Items on the exam are prepared at all cognitive levels but emphasize application and/or analysis levels of cognition. The exam has been in use for over 20 years, is updated annually, and uses a test pool of over 1200 students nationwide. The K-20 reliability coefficient for the test is reported at 0.873.

More than 70,000 graduates take the NCLEX annually. Data about individual performance is reported in a pass-fail format, but more extensive aggregate program performance is available from the test service. NCLEX uses a similar reporting process to the Mosby Assesstest and provides the school with information about the performance of graduates in scientific and quantitative reasoning as well as other areas relevant to entry-level practice as a registered nurse. While both the Assesstest and the NCLEX are administered annually, the School intends to report results to SCHEV beginning in spring, 2003, and every three years thereafter.

### **Description of Administration Process**

The Mosby Assesstest is administered to students during a 1-week period in April of each academic year. Two-hour blocks of time are used for each of the exam's four parts. The exam is administered in a secured monitored classroom setting with a proctor. The Professional Testing Corporation of New York scores the exams and returns both the

individual and group analysis to the School for review prior to distribution to the students. The entire process takes about 3 weeks.

Graduates arrange to take the NCLEX as part of the process of state licensure application. The test is developed and administered by the National Computer Systems – Pearson Company under contract with the National Council of State Boards of Nursing. The test is offered in a computer-adapted format at computer testing centers by appointment and under strict security and supervision. Results of the NCLEX are available to graduates within days. Aggregate data on pass-fail rates are provided quarterly by the state boards of nursing, and the Virginia Board of Nursing provides a breakdown of results for all nursing programs in the Commonwealth of Virginia. Detailed program analysis is available annually from the national testing service for the programs with comparison data on performance related to the aggregate test pool.

**Preliminary proposal about how results of the competency assessments will be described in a way that will be meaningful to the various publics with a stake in the quality of Virginia higher education**

The University will provide the following information about scientific/quantitative reasoning assessment results for the School of Nursing:

1. A description of the expectations for student competence in scientific/quantitative reasoning.
2. A description of the assessment process.
3. A summary of the overall results of the Assesstest.
4. Overall pass-fail rates for the NCLEX
5. Comparison of the NCLEX results with other schools of Nursing in the commonwealth of Virginia.

Submitted by: \_\_\_\_\_  
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