Steve Hix/Fuse/Thinkstock

The University of Texas at Austin
Charles A. Dana Center

Mathematics for nursing:

Recommendations from professional organizations and requirements from Texas institutions of higher education

Brought to you by the New Mathways Project, a collaboration of
The Charles A. Dana Center at The University of Texas at Austin and the Texas Association of Community Colleges

The state of nursing education and careers in Texas

Increasing the number of nurses at all credential levels—e.g., certified nursing assistant (CNA), licensed practical nurse (LPN), registered nurse (RN)—is a Texas priority. Based on projections of state and national demand for nurses, the Institute of Medicine of the National Academies' *Future of Nursing* (2010) report recommends that by 2020, 80 percent of RNs earn at least a bachelor of science in nursing (BSN) (p. 281).

In Texas, the number of students enrolled in bachelor's of

We provide these briefs to inform institutional discussions about the modernization of mathematics course requirements.

Each brief examines what constitutes relevant math for various majors (thus far, nursing, communications, criminal justice, elementary teacher education, and business) by examining professional organization recommendations and institutional requirements.

science in nursing programs increased by 95 percent between 2002 and 2012—from 5,342 students to 10,422 (Texas Center for Nursing Workforce Studies, 2013a, p. 2). Despite enrollment trends, degree attainment among Texas RNs falls short of projected demand.

As of 2011, only 50 percent of Texas RNs hold a bachelor's of science in nursing, well behind the Institute of Medicine's recommendation of 80 percent by 2020 (Texas Center for Nursing Workforce Studies, 2013b, p. 14). A 2008 Texas Higher Education Coordinating Board study (p. 4) suggests that misalignment and a lack of articulation among levels of nursing education complicate the transitions that students must make.

According to the Coordinating Board study, variations in nursing course requirements from school to school create barriers, often making student progress across institutions or from one level of coursework (e.g., for an RN credential) to the next (e.g., for a BSN credential) time-consuming and expensive. For example, students may be required to repeat curriculum content when they transfer to another program or when they pursue more advanced levels of nursing education.

Professional associations of mathematics suggest—and the Dana Center Mathematics Pathways (DCMP) participants concur—that institutions of higher education should offer multiple mathematics pathways with relevant and challenging math content aligned to specific programs of study.

What constitutes relevant math for various majors, however, is not always clear. This brief takes a look at this question for nursing by examining some recommendations of professional organizations and requirements of Texas institutions.

Nick White/Digital Vision/Thinkstock

Variations in nursing course requirements often make student progress across institutions from one level of coursework to the next time-consuming and expensive.

A committee of faculty from nine community colleges and four 4-year universities recommend students pursuing a bachelor's of science in nursing complete three hours of statistics.

photo courtesy of South Texas College

Recommendations from professional organizations of nursing and of mathematics

We reviewed reports and curricular recommendations from the Texas Higher Education Coordinating Board, accrediting organizations, and professional associations of nursing and of mathematics to identify the mathematics courses or quantitative learning outcomes recommended for nursing majors. Findings include:

- The Texas Higher Education Coordinating Board recommends a common RN curriculum framework with regional implementation and consistency at the course level (THECB, 2008, p. i). This recommendation is consistent with the Institute of Medicine recommendation outlined in *The Future of Nursing*.

- The Coordinating Board, based on the input of two-year and four-year faculty representatives, developed a field-of-study curriculum that identifies statistics (Math 1342) as the mathematics requirement for nursing bachelor's degree programs in Texas. Statistics is the only mathematics course recommended for these students.

- The statistics recommendation is consistent with the state of Oregon model for nursing education, the premier state model in the U.S according to the Texas Higher Education Coordinating Board (2008, p. 5). The Oregon model exemplifies the recommendations of the Institute of Medicine (2010) and the *American Journal of Nursing* (Lewis, 2010). All thirteen colleges participating in the Oregon Consortium for Nursing Education require one course in statistics as the only quantitative preparation for nurses (THECB, 2008, p. 8–9; OHSU, n.d.).

- The Consortium to Advance Baccalaureate Education in Texas (CABNET)—funded by an Academic Progression in Nursing grant from the Robert Wood Johnson Foundation and a Perkins-funded Leadership Grant from the Coordinating Board—designed a common nursing curriculum for public institutions in Texas (RWJF, 2012; THECB, 2011).

A committee of faculty from nine community colleges and four 4-year universities, along with representatives from the Texas Board of Nursing, Texas Higher Education Coordinating Board, and Texas Nursing Association, with consultants from University of Oregon

and University of Kansas, developed the curriculum and identified required general education courses to aid in articulation between levels of education and among nursing programs.

They recommend students pursuing a bachelor's of science in nursing complete a list of core required courses (45 hours total), including three hours of statistics—specifically, Math 1342 (Reid and Sportsman, 2013, p. 22). Seventeen Texas community colleges and four universities, including the University of Houston–Victoria, Texas Tech University, the University of Texas at Tyler, and Texas A&M University–Corpus Christi, have signed CABNET articulation agreements.

Current status of mathematics requirements for nursing programs in Texas

DCMP staff reviewed the core mathematics requirements for all 4-year public institutions of higher education in Texas and mapped the requirements for the 20 bachelor's of science in nursing programs.[A]

The table shows that most bachelor's of science in nursing programs recommend or allow statistics as part of their core curriculums. Math 1342 is the most common statistics course offered and required. Five of the 10 programs that require Math 1342 also require an additional 3 hours of mathematics, but do not designate a specific course.

Rather than require a specific mathematics course, 4 schools instead require students to complete 3 hours of core curriculum mathematics. Options include college algebra (Math 1314) (and other advanced algebra-based courses such as precalculus and calculus), statistics, and contemporary mathematics.

20 Public Universities in Texas Offer Bachelor of Science in Nursing Degrees

18	Require at least one specific course	2	Do not require a specific course. Options are available to fulfill core corriculum.
12	Require Statistics (Math 1342*)	2	Offer College Algebra (Math 1314) as an option
4	Require College Algebra (Math 1314) and Statistics (Math 1342)	1	Offers Contemporary Math (Math 1332) as an option
1	Requires College Algebra (Math 1314)	1	Offers Business Math (Math 1324) as an option
1	Requires Business Math (Math 1324)		

*Math 1342 is the Texas common course number for Elementary Statistical Methods. Math 1342 or its equivalent is the most common statistics course offered, although some institutions offer locally developed statistics courses—often applied courses for particular majors—that are not equivalent to Math 1342.

[A] See the Resources section of the Dana Center Mathematics Pathways Resource Site at *http://www.dcmathpathways.org* — in particular:

Transfer and Applicability FAQ
https://dcmathpathways.org/sites/default/files/2016-08/Texas%20Transfer%20and%20Applicability_FAQ_2014.pdf

Texas Transfer Inventory
https://dcmathpathways.org/sites/default/files/resources/2016-11/Texas%20Transfer%20Inventory_AY16-17.pdf

Conclusion

Professional associations of nursing, nursing education advocates, and the faculty committees that developed the Texas Higher Education Coordinating Board field-of-study agreement consistently recommend that undergraduate nursing students study statistics.

Most Texas nursing programs have mathematics course requirements that are consistent with these recommendations. A small number of institutions require college algebra alone or in addition to statistics—sequences not expressly supported by professional standards.

One important issue outside the scope of this brief is the mathematics needed for science courses required in nursing programs. In particular, we did not collect data on whether some students may be required to take college algebra as a prerequisite for science courses even when college algebra is not explicitly required for the degree program.

We recognize that many nursing programs require chemistry, and that basic chemistry requires proportional reasoning skills and introductory algebra skills. These skills can be learned in developmental-level courses or incorporated into college-level statistics courses to reinforce the algebra needed for subsequent science coursework. This issue should be further explored.

References

Consortium to Advance Baccalaureate Education in Texas (CABNET). *Academic Progression in Nursing.* Retrieved on February 17, 2014, from http://www.texasapin.org/APIN/Education.html

Institute of Medicine. (2010, October 5). Committee on the Robert Wood Johnson Foundation Initiative on the Future of Nursing, at the Institute of Medicine. *The Future of Nursing: Leading Change, Advancing Health.* Washington, D.C.: The National Academies Press.

Lewis, L. (2010). Oregon Takes the Lead in Addressing the Nursing Shortage: A collaborative effort to recruit and educate nurses. *American Journal of Nursing*, *110*(3), pp. 51–54.

Oregon Health and Science University School of Nursing (OHSU). (n.d). *Bachelor of Science Degree Requirements.* Retrieved February 17, 2014, from http://www.ohsu.edu/xd/education/schools/school-of-nursing/programs/upload/bs-requirements.pdf

Reid, H., & Sportsman, S. (2013). "Texas Team: Advancing health through nursing: Academic Progression in Nursing (APIN): Future of Nursing Campaign for Action." [slide deck], p. 22. Retrieved February 17, 2014, from http://www.accbd.org/wp-content/uploads/2010/08/Future-of-Nursing-Campaign-for-Action-by-Helen-Reid-EdD-RN-CNE-and-Susan-Sportsman-PhD-RN-ANEF-FAAN.pdf

Robert Wood Johnson Foundation (RWJF). (2012 August 20). "Nine states receive grants to build a more highly educated nursing workforce: Tri-Council for Nursing Leads Robert Wood Johnson Foundation-Funded Program, Which Will Support 'Action Coalitions' in CA, HI, MA, MT, NM, NY, NC, TX and WA State." Retrieved February 17, 2014, from http://www.rwjf.org/en/about-rwjf/newsroom/newsroom-content/2012/08/nine-states-receive-grants-to-build-a-more-highly-educated-nursi.html

Texas Center for Nursing Workforce Studies. (2013a March). *2012 Update on Student Admission, Enrollment, & Graduation Trends in Professional Nursing Programs.* Nursing Education Program Information Survey, p. 2. Retrieved February 17, 2014 from https://www.dshs.state.tx.us/chs/cnws/EducReports.shtm

Texas Center for Nursing Workforce Studies. (2013b January). *Nursing Workforce in Texas – 2011: Demographics and Trends.* Texas Department of State Health Services Center for Health Statistics, p. 14. Retrieved May 6, 2014 from http://www.dshs.state.tx.us/chs/cnws/Nursing-Workforce-Reports

Texas Higher Education Coordinating Board (THECB). (2008 October). *College for all Texans: A New Curriculum Model for Initial RN Licensure Programs*, pp. 4, 8–9. Retrieved February 17, 2014, from http://www.thecb.state.tx.us/reports/PDF/1650.PDF

Texas Higher Education Coordinating Board (THECB). (2011). *Perkins-funded leadership projects for 2011–2012*. Retrieved February 17, 2014, from http://www.thecb.state.tx.us/index.cfm?objectId=7CCD9BC1-DABD-2D78-7E57BECC76419B52#TVCC

About this resource

Authors:

Jenna Cullinane, *Ph.D, Higher Education Policy and Strategy Lead*

Shelby Carvalho, *Graduate Research Assistant*

Jesse Tow, *Graduate Research Assistant*

Our briefs provide information on programs for nursing, communications, criminal justice, social work, elementary teacher education, and business.

About the Dana Center

The Dana Center develops and scales math and science education innovations to support educators, administrators, and policy makers in creating seamless transitions throughout the K–14 system for all students, especially those who have historically been underserved.

We focus in particular on strategies for improving student engagement, motivation, persistence, and achievement.

The Center was founded in 1991 at The University of Texas at Austin. Our staff members have expertise in leadership, literacy, research, program evaluation, mathematics and science education, policy and systemic reform, and services to high-need populations.

For more information about the Dana Center Mathematics Pathways (DCMP), see **www.dcmathpathways.org.**