Article 3

Fit for Population Health Service: Assessing the Change in Public Health Competencies of Interprofessional Undergraduate Health Sciences Students

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Background and Introduction

A 2012 Institute of Medicine report is just one of an increasing number of recommendations to incorporate a population health approach into training of all health professionals (Kaprielian et al., 2013). From the focus of the Affordable Care Act on health promotion and disease prevention to the substandard showing of the United Sates among developed nations in terms of population health, a shift in the training of health professionals could be beneficial. Initiatives to develop health professionals who can go beyond just delivering health care to improving health and preventing disease should be a priority of academic health professional programs. Public health spans many disciplines devoted to improving the health and well-being of populations across the world.

Although the coverage of health promotion and disease prevention has increased in the curriculum of medical schools during the last decade, the population health perspective hasn't made similar gains (Kaprielian et al., 2013). Furthermore, waiting to train students to adopt a population health approach until graduate school may be too late. In 2003, the IOM report called for every undergraduate to have access to public health education indicating the nation's health would greatly benefit from a better understanding of public health (Gebbie, Rosenstock, & Hernandez, 2003). Underscoring the importance of this, for the first time ever Healthy People 2020 incorporated an objective related to undergraduate public health education (Office of Disease Prevention and Health Promotion [ODPHP], 2019).

Undergraduate Public Health Education

Additionally, undergraduate public health education has received growing attention in recent years, as there is an increase awareness of public health problems and the social context of public health issues (Robinson, Orroth, Stutts, Baron, & Wessner, 2018). In fact, it has been ranked as 10th in a list of fastest growing undergraduate programs (Leider et al., 2015). According to a study examining undergraduate public health conferrals, nearly 50,000 undergraduate students graduated with public health majors from 1992 to 2012 with half of those occurring after 2008 (Leider et al., 2015). Since 2005, a substantial increase in the number of students receiving undergraduate degrees in public health programs has occurred particularly in the areas of public health education and promotion, community health and prevention, and general public health (Leider et al., 2015). In 2009 the Association of Schools and Programs of Public Health convened an Undergraduate Task Force including representatives from Council on Education for Public Health-accredited schools and programs, AAC&U, and the Centers for Disease Control and Prevention to develop a strategy for integrating public health knowledge and principles into undergraduate education. The task force found that a need existed for an educated citizenry to promote health within their communities; consequently, they drafted a set of 34 learning outcomes that could be used to infuse public health concepts into the existing undergraduate curriculum and co-curriculum (Petersen, Albertine, Plepys, & Calhoun, 2013). Although this growth of and emphasis on public health at the undergraduate level has occurred, it is not necessary or feasible for all students pursuing careers in health care to get an undergraduate public health degree.

Public Health in Interprofessional Education

Universities are placing increased importance on providing interprofessional education and experiences for undergraduate students, in recognition of the fact that students will work in interprofessional teams throughout their careers. Knowledge of and skills in public and population health provides a common language that assists interprofessional teams in developing solutions to complex and systemic problems. Interprofessional education and experiences are beneficial not only for undergraduate students who go on to work in health care, but also for students who plan to work in business, economics, and public policy. Students who completed training modules on interprofessional teamwork "strongly agreed that incorporating the public health discipline as part of an interprofessional team is crucial to address the social determinants of health for individual health outcomes" (Anderson, August, Goldberg, Youatt & Beck, 2019, p. 1).

For Americans to experience optimal health as individuals and populations, they must have access to high quality health care services that are effectively coordinated within a strong public health system (Long, 2003). However, historically the health care delivery system has not engaged effectively with many aspects of the public health system. It is evident that more interprofessional collaboration and intentional efforts are needed to promote a deeper understanding of public health and its implications in communities across the United States and around the world. Although not everyone needs a public health degree, the benefits of public health enhancements to curricula in every discipline are evident. There are many benefits to a better-educated citizenry that understands and appreciates public health and its contributions to their lives (Petersen et al., 2013; Association of American Colleges and Universities, 2019).

In 2003, the IOM indicated that a well-educated public-health workforce was critical to the health of the public (Gebbie et al., 2003). The IOM's call for broader public health education resulted in the Educated Citizen and Public Health Initiative which supports the understanding of public-health issues as a core component of a public that has been educated and necessary for the development of one's social duty (Association of American Colleges and Universities, 2019). This was developed with the intent of responding to the growing demand for undergraduate public health courses and programs (Petersen et al., 2013). Public health is vital to the social and economic development of every country. The knowledge related to health promotion and disease prevention can no longer just be held within the public health profession. Furthermore, the emphasis on medical solutions to address health challenges, even in the face of overwhelming evidence regarding the effectiveness of community-based preventive approaches, illustrates the lack of public health competencies by health professionals. Considering the emphasis on and necessity for all future health professionals to possess core public health competencies, a medium sized public university incorporated Introduction to Public Health as a required course in their undergraduate, interprofessional Health Sciences curriculum.

Overview of the Introduction to Public Health Course

The Introduction to Public Health course was divided into the following five units: (1) Principles of Public Health, (2) Tools of Population Health, (3) Preventing Disease, Disability,

and Death, (4) Public Health Professions, and (5) Public Health Institutions and Systems. The course contained 15 online modules delivered across a 15-week semester; the students completed one online module per week. The course consisted of module activities (15% of grade), four unit quizzes (10%), midterm examination (15%), final examination (15%), the pre- and post- public health competencies self-assessment or alternative activity (5%), and the public health project (40%). The public health project, a substantial part of the course that was conducted in stages throughout the semester, encompassed a public health proposal, issue statement, intervention paper, discussion board presentation, and discussion board presentation responses. As part of the course, the students completed the Tier 1 Public Health Professionals Competency Assessment as a pre- and posttest.

Purpose

The purpose of this study was to assess the change in core public health competencies of undergraduate, interprofessional Health Sciences students that completed an Introduction to Public Health course.

Methods

Research Design
This pilot study was approved by the university Institutional Review Board. A one group pre and posttest quasi-experimental design was utilized. The 2014 Version of the Tier 1 Public Health Professional Competency Assessment was delivered via the University's Learning Management System. The online pre-course and post-course surveys were administered during Weeks 1 and 14 of the academic semesters.

Participants
Purposive sampling was used to focus on the undergraduate Health Sciences students within the online Introduction to Public Health course at a medium sized public University in the midwest. Participation was voluntary. Critera for study inclusion were: (a) baccalaureate students in the Bachelor of Health Science program, (b) age 18 and older, (c) enrolled in the Introduction to Public Health course, and (d) able to read and understand study consent written in English.

Instrument
The instrument utilized was the existing, validated 2014 Version of the Tier 1 Public Health Professionals Competency Assessment which was adapted by the Public Health Foundation from an assessment developed by Janet Place, MPH, and provided by the Council on Linkages between Academia and Public Health Practice. It is available for use free of charge online at http://www.phf.org/resourcestools/Documents/Competency_Assessment_Tier1_2014.pdf. The Core Competencies for Public Health Professionals are a consensus set of foundational skills, defined by the 10 Essential Public Health Services, that are desirable for professionals engaging or desiring to engage in practice, education, and/or research related to public health. The Core Competencies are organized into eight skill areas or domains that cut across public health disciplines (see Table 1). Public health organizations, professionals, and academic institutions across the United States are using the Core Competencies for Public Health Professionals as a

baseline to better comprehend, assess, and address educational, training, and workforce development needs (Council on Linkages, 2014). The competency assessment, which takes around 20 minutes to complete, is divided into the following eight sections from the 2014 version of the Core Competencies: Analytical/Assessment Skills, Policy Development/Program Planning Skills, Communication Skills, Cultural Competency Skills, Community Dimensions of Practice Skills, Public Health Sciences Skills, Financial Planning and Management Skills, and Leadership and Systems Thinking Skills (Council on Linkages, 2014).

Table 1. Tier 1 Core Public Health Competencies

Domain	Description
Analytical/ Assessment Skills	Analytical/Assessment Skills focus on identifying and understanding data, turning data into information for action, assessing needs and assets to address community health needs, developing community health assessments, and using evidence for decision making.
Policy Development/ Program Planning Skills	Policy Development/Program Planning Skills focus on determining needed policies and programs; advocating for policies and programs; planning, implementing, and evaluating policies and programs; developing and implementing strategies for continuous quality improvement; and developing and implementing community health improvement plans and strategic plans
Communication Skills	Communication Skills focus on assessing and addressing population literacy; soliciting and using community input; communicating data and information; facilitating communications; and communicating the roles of government, health care, and others
Cultural Competency Skills	Cultural Competency Skills focus on understanding and responding to diverse needs, assessing organizational cultural diversity and competence, assessing effects of policies and programs on different populations, and taking action to support a diverse public health workforce.
Community Dimensions of Practice Skills	Community Dimensions of Practice Skills focus on evaluating and developing linkages and relationships within the community, maintaining and advancing partnerships and community involvement, negotiating for use of community assets, defending public health policies and programs, and evaluating effectiveness and improving community engagement.
Public Health Sciences Skills	Public Health Sciences Skills focus on understanding the foundation and prominent events of public health, applying public sciences to practice, critiquing and developing research, using evidence when developing policies and programs, and establishing academic partnerships.
Financial Planning & Management Skills	Financial Planning and Management Skills focus on engaging other government agencies that can address community health needs, leveraging public health and health care funding mechanisms, developing and defending budgets, motivating personnel, evaluating and improving program and organization performance, and establishing and using performance management systems to improve organization performance.
Leadership & Systems Thinking Skills	Leadership and Systems Thinking Skills focus on incorporating ethical standards into the organization; creating opportunities for collaboration among public health, health care, and other organizations; mentoring personnel; adjusting practice to address changing needs and environment; ensuring continuous quality improvement; managing organizational change; and advocating for the role of governmental public health

Data Analysis

Participants were instructed for each domain and corresponding competency statement to think about the level at which they are currently able to perform that skill and rate their level of proficiency for each statement by selecting the number on the continuum from 1=None (I am unaware or have very little knowledge of the skill), 2=Aware (I have heard of, but have limited knowledge or ability to apply the skill), 3=Knowledgeable (I am comfortable with my knowledge or ability to apply the skill), and 4=Proficient (I am very comfortable, am an expert, or could teach this skill to others). Each of the eight domains has between 7 to 14 corresponding competency statements. To calculate the score for each domain, the sum of the scores within a domain were divided by the number of statements within that domain. Data from the surveys were downloaded to a password protected computer and data analysis was completed using SPSS Statistical Software to determine if there were significant differences in pre and post-course mean scores for the eight domains of public health competency.   A paired-samples t-test was conducted to compare the pre-course and post-course mean scores for each of the eight domains.

Results

Results of this study showed a significant increase in the scores of the participants (N=24) from pre to posttest in all eight domains. Of the eight domains, 100% of the mean scores were below a 3 (comfort with knowledge or ability to apply the skill) on the pretest, with one of the domains, Analytic/Assessment Skills, lower than a 2 (limited knowledge or ability to apply the skill); in contrast, scores on all eight domains were above a 3 on the posttest. Although the analytic/assessment skills domain had the lowest pretest scores (M=1.62, SD=0.40) this domain had the largest change (1.67) between pretest and posttest scores (M=3.29, M=.42) (see Tables 2 & 3).

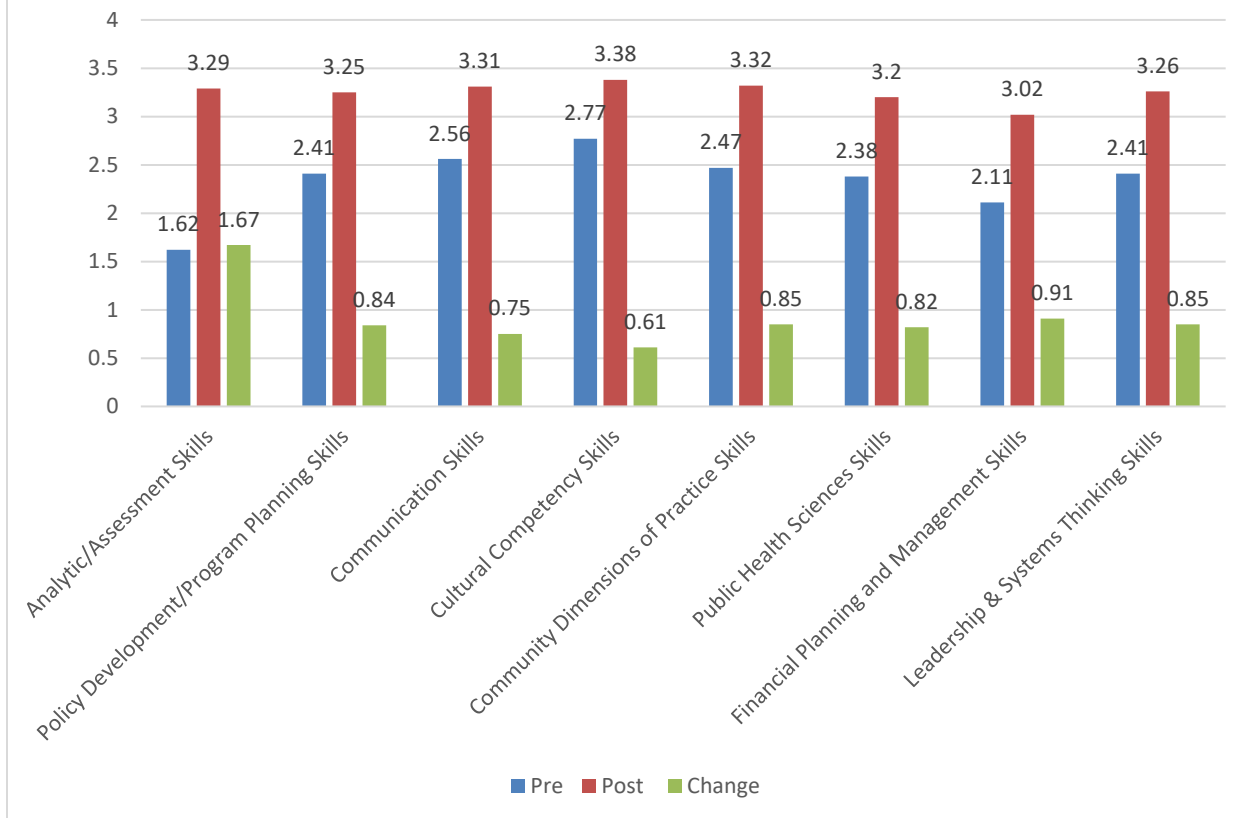Table 2. Public Health Competency Assessment
Mean Pre, Post, & Change Scores

Domain	Pre	Post	Change
Analytic/Assessment Skills	1.62	3.29	1.67
Policy Development/Program Planning Skills	2.41	3.25	0.84
Communication Skills	2.56	3.31	0.75
Cultural Competency Skills	2.77	3.38	0.61
Community Dimensions of Practice Skills	2.47	3.32	0.85
Public Health Sciences Skills	2.38	3.2	0.82
Financial Planning and Management Skills	2.11	3.02	0.91
Leadership & Systems Thinking Skills	2.41	3.26	0.85

Table 3. Paired t-test comparing pre-post public health competencies

Domain	Pre-course Mean (SD)	Post-Course Mean (SD)	Mean Difference	t-value
Analytical/ Assessment	1.62 (.40)	3.29 (.43)	1.67	$t(24)=-24.62$
Policy Development/ Program Planning	2.41 (.59)	3.25 (.50)	.84	$t(23)=-8.24$
Communication	2.56 (.56)	3.31 (.53)	.75	$t(23)=-8.22$
Cultural Competency	2.77 (.59)	3.38 (.52)	.61	$t(23)=-6.32$
Community Dimensions of Practice	2.47 (.55)	3.32 (.57)	.85	$t(23)=-7.14$
Public Health Sciences	2.38 (.47)	3.20 (.55)	.82	$t(23)=-12.60$
Financial Planning & Management	2.11 (.54)	3.02 (.64)	.91	$t(23)=-9.82$
Leadership & Systems Thinking	2.41 (.65)	3.26 (.52)	.85	$t(24)=-9.81$

The analytic and assessment skills domain had the lowest pretest scores with all of the fourteen competencies falling below a 2.0 average to include competencies such as identifying quantitative and qualitative data and information (M=1.39, SD=.49), describing public health applications of data (M=1.36, SD=.78), and explaining how community health assessments utilize information (M=1.36, SD=.55). The financial planning and management skills domain had the second lowest pretest scores with 50% of the 14 competencies falling below a 2.0 average to include competencies such as contributing to the development of program budgets (M=1.66, SD=.59) and providing information for funding proposals (M=1.75, SD=.75). Other competencies that were low on the pretest included contributing to the public health evidence base (M=2.00, SD=.71), suggesting partnerships that may increase use of evidence in public health practice (M=1.94, SD=.79), and identifying facilitators and barriers that may affect the delivery of the 10 Essential Public Health Services (M=1.88, SD=.74).

Although there was an increase in competencies across all the domains, analytic and assessment skills had the largest increase to include particularly high posttest scores in describing public health applications of data (M=3.42, SD=.7), describing assets and resources that can be used to improve the health of a community (M=3.46, SD=.5), explaining how community health assessments use information (M=3.50, SD=.58), and describing how evidence is used in decision making (M=3.54, SD=.58). Other competencies that were high on the posttest in the remaining seven domains included describing the ways diversity influences policies, programs, services, and the health of a community (M=3.58, SD=.57), describing the value of diverse public health workforce (M=3.50, SD=.57), supporting relationships that improve the health in a community (M=3.42, SD=.63), incorporating ethical standards of practice in public health interactions (M=3.42, SD=.63), communicating information to influence behavior and improve health (M=3.38, SD=.56), describing how evidence is used in decision making (M=3.54, SD=.57), contributing to the implementation of strategic plans (M=3.46, SD=.57), applying strategies for continuous quality improvement (M=3.42, SD=.63), and identifying current trends affecting the health of a community (M=3.42, SD=.49).

These results suggest that students enrolled in an undergraduate, interprofessional Health Sciences program who completed an Introduction to Public Health course showed significant gains in the core public health competencies, across all eight domains.

Discussion

Implications for Health Sciences Undergraduate Education
This study demonstrates that an Introduction to Public Health course can effectively increase the core public health competencies of undergraduate students that are aspiring health professionals. The results also suggest that the 2014 Version of the Tier 1 Public Health Professionals Competency Assessment tool can be used effectively with college students and future health care providers to assess foundational skills for the broad practice of public health. The assessment can be used as a pedagogical tool to provide insight for course instructors into the areas and specific competencies that need to be emphasized within the course.

In a study conducted to assess the use of the Public Health Foundation's Tier 1 Public Health Professionals Competency Assessment to examine prelicensure baccalaureate nursing students'

self-reported levels of public health competence, significant differences were found in the pre and post-aggregate mean scores for each of the eight domains (Siemon, Gallegos, & Gehrke, 2018). The authors concluded that the Competency Assessment for Tier 1 Public Health Professionals can assist nursing faculty with assessing pre-course learning needs and post-course evaluation of self-reported competence in public health (Siemon et al., 2018). Our study expanded the use of this assessment with a broader range of pre-health professional students through implementation within an undergraduate Health Sciences program. Additionally, our study noted specific competencies within each domain with lower and higher scores pre and post-course.

Many of the undergraduate students in majors such as Health Sciences that are preparing for both clinical and non-clinical careers in health care have rigorous undergraduate preparation as they complete the pre-requisite courses for their graduate programs in addition to their major requirements; consequently, many may not have time to complete an entire major, minor, or concentration in public health. This study demonstrates that an introductory public health course can provide many of the core competencies needed for a basic, entry level understanding of public health that can enhance the understanding of and ability to collaborate to improve the health of the communities that these students will eventually serve as health care providers.

Limitations

The authors recognize several limitations of this study including the small sample size of students and data collected from one location which limits the generalizability. Another major limitation is the lack of a control or comparison group. There is no way to determine what the self-reported competencies of the students would have been if they hadn't completed the course. Although an easy and quick way to collect data related to this topic, self-reported data is subject to things like social desirability bias. Despite the limitations of this study, findings provide valuable implications for interprofessional undergraduate programs such as Health Sciences to provide a survey course to increase the public health competencies of future health professionals.

Recommendations

Beyond the use of the Tier 1 Public Health Professionals Competency Assessment as a pedagogical tool, lies the importance of assessing which public health competencies are most important for future health professionals and ensuring those are effectively covered within the survey course and/or curriculum. Future suggestions would be to utilize the survey results to inform the course and curriculum. The benefits of the acquisition of public health competencies by undergraduate, interprofessional health sciences students extend beyond this course. Further evaluation of these competencies through courses and experiential activities can help inform incorporation of the competencies into the curriculum.

Conclusion

Collaboration and concerted efforts need to be implemented to promote a better understanding of public health and its implications in communities around the world. A more cohesive and collective response to addressing the public health and health care challenges we face is needed. It is not necessary for everyone to receive a degree in public health; however, the benefits of integrating public health into curricula of future health professionals and beyond is evident. As these concepts are integrated into programs, it is important that they align with the core competencies established and are assessed accordingly.

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