


# Health Professions Students' Assessment of an Interprofessional Rural Public Health-Focused Rotation: A Pilot Study Based on the Community-Oriented Primary Care Approach

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**ABSTRACT:** Using a community-oriented primary care (COPC) approach, the format for this interprofessional rural rotation was a public health focused team project based in a local health department and primary care setting. The target audience included fourth-year dental students, fourth-year undergraduate students in imaging science, second-year master of public health students, third-year medical students enrolled in the MD/MPH program, second-year nurse practitioner students, fourth-year pharmacy students, second-year MSN nursing students, and first-year PhD students. The specific learning objectives of the curriculum were drawn from emphasis areas of the Interprofessional Education Collaborative's competency domains and included the development of students' knowledge to function as a member of an interprofessional team to (1) engage diverse health care professionals, (2) communicate with team members to clarify each member's responsibility in executing components of a public health intervention, (3) choose effective communication tools and techniques, (4) integrate knowledge and experience of other professions, and (5) engage themselves and others to constructively manage disagreements.

Additional learning objectives centered on 10 competencies from the Master's Degree in Public Health Core Competency Project. Assessment of 13 student participants, as a group, showed increased perceived knowledge in 4 out of 5 selected interprofessional emphasis areas and 9 out of 10 public health competencies. Our curriculum provides promising evidence for one interprofessional rural education model with proven short-term effectiveness among six health professions disciplines, in increasing student knowledge in interprofessional emphasis areas and public health competencies.

**KEYWORDS:** Interprofessional health professions education, rural, public health, community-oriented primary care

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## Background

Educational organizations representing allied health professions,<sup>1</sup> dentistry,<sup>2</sup> medicine,<sup>3</sup> nursing,<sup>4,5</sup> pharmacy,<sup>6</sup> and public health<sup>7,8</sup> outline expectations for interprofessional education (IPE). However, in light of scant research evaluating the effectiveness of IPE, a 2015 review emphasized the need for further studies to examine the IPE evidence-base.<sup>9</sup> IPE is defined as students from 2 or more professions learning about, from, and with each other "to enable effective collaboration and improve population outcomes."<sup>10</sup> Support for IPE is based on the premise that collaborative practices across disciplines will increase the effectiveness of

healthcare delivery systems to promote team-based, patient/family-centered services.<sup>1</sup>

Interprofessional education is especially important for rural communities where healthcare professions shortages often exist making effective teamwork among those present more essential.<sup>11,12</sup> While provisions in the Affordable Care Act underscore the need for a workforce that can address patient and community-level needs,<sup>13</sup> we could not identify a rural IPE curriculum that focused on public health. Rooted in the principles of community-oriented primary care (COPC),<sup>14</sup> the curriculum described in this article represents an experiential



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interprofessional rural rotation with a public health focus. Community-oriented primary care is a model for integrating primary care and public health and includes “the practice of primary care with population responsibility, oriented to the health improvement of a defined community.”<sup>15</sup> Community-oriented primary care has been employed internationally and in the United States.<sup>14</sup>

## Methods

### *Development and implementation of the curriculum*

Located in Nebraska, a predominantly rural state, the University of Nebraska Medical Center, a public university, includes Colleges of: Allied Health Professions, Dentistry, Medicine, Nursing, Pharmacy, and Public Health. A lead faculty member in the College of Public Health convened an IPE workgroup which included faculty from all the colleges of the academic institution and a preceptor from the East Central District Health Department, a local public health department. The workgroup developed health student assignments based on 3 health-related priority areas: tobacco use, colorectal cancer screening, and suicide prevention. These priorities were identified in the health department’s needs assessment of the served population.<sup>16</sup> The interprofessional rural rotation took place at the East Central District Health Department, a public health department located in a rural medically underserved area. The health department serves a population of 52 000 within a 2219 square mile area. The student teams were paired with a preceptor at the local health department, the chief public health officer, who directly supervised the students. The health department was selected due to the large number of students from different colleges participating in clinical rotations at a neighboring site, a federally qualified health center. The academic partners and the site preceptor’s supervisor jointly developed expectations for the preceptor whose time on the rotation was supported through a grant. At the end of the rotation, student teams provided the leadership of the health department with a written report that made specific recommendations for interventions to address 1 out of the 3 priority issues. The University of Nebraska Medical Center Institutional Review Board (IRB) determined that the evaluation of the rotation constituted quality improvement and therefore no materials were required for IRB submission.

Faculty from each college identified students who participated in the rotation. To permit students from each college to participate, the IPE workgroup determined that students should have the ability to take part in the rotation on a volunteer basis as part of an existing rotation or as a separate elective for credit toward their program requirement. To accommodate the schedules of all colleges, the students’ time commitment to the rotation varied from 12 to 120 hours depending on the discipline.

Some of the student’s primary purpose for participating in a rotation was a rural primary care clinical commitment. These

students participated in the rotation by having interprofessional activities that overlay or “float on top” of each student’s profession specific curricular specific activities, providing the opportunity of the trainees to reflect on their role as a member of an interprofessional team while engaged in their rural rotation.<sup>17</sup> Efforts were made to match student rotation start and stop times to allow for maximized IPE time.<sup>17</sup> Thirteen students of whom 2 were men and 11 were women, were placed into 4 teams. The first team consisted of 3 students: NP (in their final year), BS in Medical Imaging and Therapeutic Sciences (in the final year of their undergraduate studies), and a DDS (in their final year) students who took part in the rotation as a part of an existing clinical rotation and had less time to commit to the rotation in comparison to the next 3 teams of students. The second team included 2 students in their final years of study, an MPH and a PharmD student. The third team included 4 students: of which 2 were MD/MPH students (in the fourth year of their 5-year dual-degree program), 1 was an MPH student (in their final year), and 1 was a PhD student in health promotion (in their first year). The fourth team included 4 students, all in their final year of study, 3 were Master of Science in nursing students and 1 was an MPH student. Members of the second, third, and fourth teams participated in the rotation specifically for course credit and not as part of another rotation. The curriculum provided practice-based and self-reflective interprofessional learning with limited didactic teaching,<sup>18</sup> and included readings from the Interprofessional Education Collaborative Expert Panel core competencies<sup>8</sup> and the 2015 Health Department Community Health Needs Assessment.<sup>16</sup> Additional assigned readings focused on 1 of the 3 health condition priority areas. Tenets of the COPC principles and process approach were used as a framework for the students to integrate public health and primary care in addressing the care of the selected priority areas of health conditions.<sup>14</sup>

The COPC principles include: responsibility for the health of a defined community; health care based on identified community population health needs; prioritization; comprehensive care; and community involvement.<sup>14</sup> Based in a primary care setting, the COPC process includes the following steps: community definition and community characterization, health problem prioritization, detailed assessment, intervention, evaluation, and reassessment (see Figure 1).<sup>14</sup> Student activities focused on community definition and characterization, detailed assessment, and intervention identification and included:

- Defining and characterizing the community served by the preceptor site, by physical, sociodemographic, resources and assets, and health status of the community (COPC community characterization).
- Assessing the health department’s care functions, health service delivery area, user population, and the health status of user population within the preceptor site’s health service delivery area based on existing clinical

## COPC: PRINCIPLES & PROCESS



Figure 1. The COPC Cycle.

data (COPC community characterization and detailed problem assessment).

- Conducting key informant interviews with stakeholders (eg, providers; policymakers; elected officials, local, state, and national; advocacy groups, and other interested parties) to learn more about their functions and criteria/decision in relation to each one of the priority areas (COPC; prioritization and detailed problem assessment).
- Conducting literature reviews on evidence-based interventions addressing tobacco use, colorectal cancer screening, and suicide prevention in rural communities and making the appropriate recommendations for intervention implementation in the particular community served by the health department (COPC intervention planning)
- Analyzing what existing initiatives are in place to address a particular public health issue.
- Examining what more can be done and what would be the expected outcome of creating an intervention plan to address the public health issue.
- Identifying what measures are needed to continue health surveillance of the community and to evaluate the effects of existing programs and recommended interventions to address the public health issue.
- Attending meetings focused on the public health issue such as: advocacy group meetings, city council meetings, and legislative hearings.
- Attending and participating in the lectures on topics related to the priority areas.
- Developing a final report using COPC as a framework to address the selected public health issue and present the report to the leadership of the health department

Depending on where in the COPC cycle the students joined the project and the time they had allocated toward the project, students engaged in some but not all of the described activities.

As part of the self-reflective aspects of the curriculum, students were asked to consider the greatest interprofessional

challenge they experienced during the rotation and what they did to overcome that challenge. Didactic components of the rotation included lectures on the COPC approach, interprofessional health professions team work, the roles of local health departments, and topics specific to the priority area of study.

### Evaluation

We employed a pre-post design to examine student changes in knowledge in interprofessional team emphasis areas and public health competencies. We developed a questionnaire to measure students' perceived knowledge of the following interprofessional emphasis areas from the competency domains of the IPE collaborative.<sup>8</sup> We asked them to rate their knowledge of each of the following domains on a scale from 1 to 4.

1. Roles/Responsibilities for Interprofessional Practice.
  - (a) Engage diverse health care professionals who complement one's own professional expertise, as well as associated resources, to develop strategies to meet specific population health needs.
  - (b) Communicate with team members to clarify each member's responsibility in executing components of public health intervention.
2. Interprofessional Communication Practices.
  - (a) Choose effective communication tools and techniques, including information systems and communication technologies, to facilitate discussions and interactions that enhance team function.
3. Interprofessional teamwork and team-based practice.
  - (a) Integrate the knowledge and experience of other professions—appropriate to the specific care situation—to inform public health intervention while respecting community values and priorities/preferences.
  - (b) Engage self and others to constructively manage disagreements about values, roles, goals, and actions that arise among healthcare professionals and with communities.

We measured students' perceived knowledge regarding public health competencies by asking them to rate their knowledge of each of the following public health competencies from the Association of Schools and Programs of Public Health Master of Public Health core competencies<sup>8,19</sup> on a scale from 1 to 4:

1. Communication and Informatics.
  - (a) Demonstrate effective written and oral skills for communicating with different audiences in the context of professional public health activities.
  - (b) Use information technology to access, evaluate, and interpret public health data.
2. Epidemiology.
  - (a) Describe a public health problem in terms of magnitude, person, time, and place.

**Table 1.** Pretest-posttest comparisons related to knowledge of interprofessional practice competencies.

COMPETENCY DOMAINS AND EMPHASIS AREAS	N	MEAN	STANDARD DEVIATION	MEDIAN	MINIMUM	MAXIMUM	P
Roles/responsibilities for interprofessional practice							
Post-pre difference “Engage diverse healthcare professionals who complement one’s own professional expertise, as well as associated resources, to develop strategies to meet specific population health needs”	13	1.08	0.86	1.00	0.00	4.00	0.002
Post-pre difference “Communicate with team members to clarify each member’s responsibility in executing components of a public health intervention”	13	0.92	0.49	1.00	0.00	0.00	0.001
Interprofessional Communication Practices							
Post-pre difference “Choose effective communication tools and techniques, including information systems and communication technologies, to facilitate discussions and interactions that enhance team function”	13	1.08	0.86	1.00	0.00	2.00	0.0039
Interprofessional teamwork and team-based practice							
Post-pre difference “Integrate the knowledge and experience of other professions— appropriate to the specific care situation—to inform public health intervention while respecting community values and priorities/ preferences”	13	0.85	0.55	1.00	0.00	2.00	0.002
Post-pre difference “Engage self and others to constructively manage disagreements about values, roles, goals, and actions that arise among healthcare professionals and with communities”	13	0.54	0.97	1.00	−2.00	2.00	0.12

- (b) Explain the importance of epidemiology for informing scientific, ethical, economic, and political discussion of health issues.
- (c) Communicate epidemiologic information to lay and professional audiences.
3. Health Policy and Management.
  - (a) Communicate health policy and management issues using appropriate channels and technologies.
  - (b) Apply “systems thinking” for resolving organizational problems.
4. Social and behavioral sciences.
  - (a) Identify critical stakeholders for the planning, implementation, and evaluation of public health programs, policies, and interventions.
  - (b) Describe the role of social and community factors in both the onset and solution of public health problems.
  - (c) Describe the merits of social and behavioral science interventions and policies.

The pretest and posttest questions used a 4-point Likert-type scale. The Wilcoxon rank sum test, a nonparametric test appropriate for small sample sizes and Likert-type response variables, was used to compare the median response value for the preassessment to the median response value for the postassessment. Response values were scored: 1=“Not at all knowledgeable”; 2=“Somewhat knowledgeable”; 3=“Knowledgeable”; 4=“Very

knowledgeable.” A *P* value < .05 was considered statistically significant. Data were analyzed using SAS, version 9.4 (SAS Institute Inc, Cary, NC, USA, 2013).

## Results

All 13 students completed the pretests and posttests at the beginning and end of the rotation. Evaluation of the students as a group showed increased, perceived knowledge in 4 out of the 5 following emphasis areas: “to engage diverse health care professionals” (*P*=0.02), “to communicate as a member of an interprofessional team” (*P*=0.01), to “choose effective communication tools and strategies” (0.0039), and “to integrate knowledge and experience of other professions as a member of an interprofessional team” (*P*=0.002). There was no statistically significant change in response to the question relating to managing team disagreements (see Table 1). In 9 out of 10 of the public health competencies, the group showed increased knowledge at the postassessment compared to the preassessment: “demonstrate effective written and oral skills for communicating with different audiences in the context of professional public health activities” (*P*=0.0078), “use information technology to access, evaluate and interpret public health data” (*p*=0.002), “describe a public health problem in terms of magnitude, person, time and place” (*P*=0.0078), “explain the importance of epidemiology for informing scientific, ethical, economic and political discussion of health issues” (*P*=0.031), “communicate epidemiologic information to lay and professional audiences” (*P*=0.0078),

**Table 2.** Pre-post test comparisons related to knowledge of public health competencies.

COMPETENCE	N	MEAN	STANDARD DEVIATION	MEDIAN	MINIMUM	MAXIMUM	P
<b>Communication and informatics</b>							
Post-pre difference “Demonstrate effective written and oral skills for communicating with different audiences in the context of professional public health activities”	13	0.92	0.86	1.00	0.00	4.00	0.0078
Post-pre difference “Use information technology to access, evaluate and interpret public health data”	13	0.92	0.64	1.00	0.00	2.00	0.0020
<b>Epidemiology</b>							
Post-pre difference “Describe a public health problem in terms of magnitude, person, time and place”	13	0.77	0.73	1.00	0.00	2.00	0.0078
Post-pre difference “Explain the importance of epidemiology for informing scientific, ethical, economic and political discussion of health issues”	13	0.69	0.85	1.00	-1.00	2.00	0.031
Post-pre difference “Communicate epidemiologic information to lay and professional audiences”	13	0.77	0.73	1.00	0.00	2.00	0.0078
<b>Health Policy and Management</b>							
Post-pre difference “Communicate health policy and management issues using appropriate channels and technologies”	13	0.92	0.86	1.00	-1.00	2.00	0.0088
Post-pre difference “Apply “systems thinking” for resolving organizational problems	13	1.54	0.66	1.00	1.00	3.00	0.0002
<b>Social and Behavioral Sciences</b>							
Post-pre difference “Identify critical stakeholders for the planning, implementation and evaluation of public health programs, policies and interventions”	13	1.08	1.12	1.00	-2.00	2.00	0.014
Post-pre difference “Describe the role of social and community factors in both the onset and solution of public health problems”	13	0.38	1.04	0.00	-1.00	2.00	0.26
Post-pre difference “Describe the merits of social and behavioral science interventions and policies”	13	0.46	0.52	0.00	0.00	1.00	0.031

“communicate health policy and management issues using appropriate channels and technologies” ( $p=0.0088$ ), “apply systems thinking” for resolving organizational problems” ( $P=0.0002$ ), “identify critical stakeholders for the planning, implementation and evaluation of public health programs, policies and interventions” ( $P=0.014$ ), and “describe the merits of social and behavioral science interventions and policies” ( $P=0.031$ ). There was no statistically significant difference in pretest and posttest responses to questions about “the role of social and community factors in both the onset and solution of public health problems” (see Table 2).

**Discussion**

The experiential IPE rural rotation model described in this article using tenets of COPC had students representing 6

colleges at the academic institution: allied health, dentistry, medicine, nursing, pharmacy, and public health. We used priorities identified in the health department’s community health needs assessment to guide the public health topics integrated into the experiential learning experience.<sup>16</sup> Our results support findings from the urban interprofessional curriculum implemented at Tufts University suggesting that “a multi-school community-partnered practice-based course is feasible and can meet learning objectives.”<sup>18</sup> In 4 out of 5 selected interprofessional emphasis areas and 9 out of 10 public health competencies of our pilot curriculum, the group, as a whole, demonstrated increased perceived knowledge between preassessments and postassessments. Furthermore, to allow for flexibility in having all 6 colleges participate in the rotation, we used an approach demonstrated in the literature, where IPE activities that “float”

on top of their clinical commitments allow the students to engage in interprofessional collaboration activities.<sup>17</sup> The findings reported from our experiential curriculum add to the evidence of the effectiveness of IPE to the available literature. Our curriculum provides one rural IPE model for exercising public health competencies, using a COPC framework.

The increasing role of health care delivery systems in promoting the health of defined populations represents a central tenet of health care reform in the United States.<sup>13</sup> Signed into federal US law in 2010, the Patient Protection and Affordable Care Act (Affordable Care Act) significantly expanded health care coverage for the nation's citizens. Provisions in the Affordable Care Act such as the establishment of accountable care organizations, networks of providers responsible for managing the health of a defined Medicare population, and incentivized population health management underscore the need for a workforce that can address population and patient-level needs together and by the same health team.<sup>13</sup> Developing curriculums for health care professions students and residents with emphasis areas that integrate population health and primary care advances this agenda. COPC provides a conceptual and methodological framework for health profession students to leverage new and existing community-level data to implement community-oriented interventions that integrate public health and primary care in a practice-based setting.<sup>20</sup> In 2012, the US National Academy of Medicine, formerly known as the Institute of Medicine (IOM) identified COPC as a dynamic, interdisciplinary model that integrates primary care and public health creating significant improvements in primary care delivery.<sup>21</sup> COPC has also been identified as an effective framework in serving as the training ground for interprofessional teams while improving population health. The use of COPC in our experiential pilot curriculum aligns with 2012 IOM recommendations, which concluded that a "retooled workforce is one of the most promising ways to model and encourage more complete integration."<sup>21</sup>

This retooling requires the education of primary care providers about public health; the education of public health workers about primary care; and, most importantly, the development of "a new cadre of workers who can bridge both sectors in pursuit of improved population health."<sup>21</sup> There are limitations with our study examining this experiential curriculum. We had a small number of students participate in the rotation. In addition, the students spent different amounts of time on the rotation. Some students spent their entire rural rotation focused on the interprofessional components, anywhere from 40 to 120 hours, while others had their interprofessional activities "float on top" of their clinical commitments,<sup>17</sup> spending less time on the rotation. This issue underscores the challenge in ascertaining dosing impacts on the pre-post changes in this small sample. Literature suggests that a 40-hour interprofessional training experience can increase the knowledge and skills of students and create positive interactions with other health professions.<sup>11</sup> The small number of teams, varying sizes of teams (2-4 people), and different time spent on the

interprofessional rotation by the students make drawing meaningful conclusions using comparative statistics unreliable.

In summary, our curriculum provides evidence for one promising rural IPE model with proven short-term effectiveness among 6 health professions disciplines, in increasing knowledge of interprofessional emphasis areas and public health competencies. Features for consideration regarding program sustainability include having student teams work collectively on a project that addresses a priority of the site hosting the rotation while meeting academic requirements, in addition to financial support for the site preceptor. Future rotations should continue to use COPC as a framework and include a 40-hour commitment of all participating students while allowing flexibility for students to have IPE rotations float on top of existing clinical rotations.

### Author Contributions

PJ, CS, and EL, were responsible for the development of the research question, design and concept of the work. MT was responsible for evaluation design of the education intervention. EL was responsible for biostatistical input. BG was responsible for content expertise relating to public health education and JG and ADAR for community oriented primary care expertise. SM, MS, and the other authors contributed to the interpretation of the data, its discussion, reviewed and agreed to the final version of the paper.

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