



Teaching Community Health Needs Assessment to First Year Medical Students: Integrating with Longitudinal Clinical Experience in Rural Communities

Sarah Beehler¹ · James Boulger¹ · Samantha C. Friedrichsen² · Emily C. Onello¹

Published online: 22 March 2019

© Springer Science+Business Media, LLC, part of Springer Nature 2019

Abstract

Community health education is especially important for physicians who will practice in rural communities. However, the majority of efforts to teach community and population health in medical school appear in later years and focus on non-rural contexts. This article presents data from a formative evaluation of a newly developed curricular component on population health and community health assessment for first year medical students in a rural longitudinal clinical preceptorship. Curricular elements included: a classroom lecture and review of online community health databases, an individual homework assignment and a classroom debriefing session. In a sample of 210 students, pre- and post-course surveys and exam questions assessed gains in awareness and skills over the course period. Analyses of data aggregated over four academic years (2013–2014 to 2016–2017) showed that first year medical students reported significant increases in familiarity with online resources (29.5% pre vs. 94.8% post, $p < .001$), understanding the importance of community health assessments (67.5% pre vs. 96.7%, $p < .001$), knowing how to plan a community health assessment (20.0% pre vs. 90.5%, $p < .001$), and awareness of Affordable Care Act expectations for community health assessments (12.4% pre vs. 82.4% post, $p < .001$). Further, students performed well on exam questions and reported that this component fit well with the objectives of the rural longitudinal clinical preceptorship course. Later-year education should reinforce early learnings and future studies involving long-term follow-up of physicians could assess the impact of early exposure to community health education on physician behaviors.

Keywords Community health assessment · Population health · Rural health · Medical education · Formative evaluation

Introduction

Recruiting and retaining physicians for practice in rural communities is an ongoing challenge for countries across the world. Historical and projected workforce shortages have led to innovation in undergraduate medical education, including longitudinal clinical programs (LCPs) in which students are embedded in rural areas for a period of time with physicians [1–3] and/or community members [4]. In the United States, rural longitudinal clinical placements are not mandated but are considered a best practice in medical training for rural

practice [5]. LCPs vary considerably in structure & timing of delivery during medical training but generally produce positive outcomes for students, including: improved understanding of patient lives and experiences, development of skills and confidence, student satisfaction, and commitment to rural and primary care practice [6–11]. Further, LCPs provide opportunities for students and medical schools to identify and address community concerns with the aim of improving health outcomes [7, 12, 13].

Understanding population health determinants and developing skills in community health assessment prepares physicians to practice effectively in diverse and underserved communities [14–16]. Many medical schools have established curricula in the areas of community and population health, cultural sensitivity, health disparities and socioeconomic determinants of health [17, 18]. In the U.S., this occurred partly in response to the Clinical Prevention and Population Health Curriculum Framework [19], developed to enhance prevention and population health

✉ Sarah Beehler
sjbeehle@d.umn.edu

¹ Department of Family Medicine & Biobehavioral Health, University of Minnesota Medical School, Duluth Campus, 1035 University Drive, Duluth, MN 55812, USA

² Professional Data Analysts, Inc, Minneapolis, MN, USA

content in clinical health professional training. In addition, a framework of 58 physician competencies, including applying scientific principles and epidemiological skills to understand and address social and structural determinants of population health, was published by the Association of American Medical Colleges [20]. Combined with nationwide policy, these sparked innovations in medical curricula on population health. The 2010 Patient Protection and Affordable Care Act (ACA) introduced sweeping changes to the healthcare landscape in the United States, linking physician and healthcare system performance explicitly to population health for the first time [21]. For example, the ACA added a requirement that nonprofit hospitals conduct a community health needs assessment (CHNA) every 3 years. This mandate has sparked new collaborations (e.g., between hospitals and public health) and has prompted development of community health data repositories to facilitate CHNAs. It also provides a natural educational opportunity for medical students to learn about the CHNA process, identify community needs and analyze publicly available population health data. Further, these learning objectives align well with the community-oriented training goals of most rural LCPs.

In 2013 we developed a curricular component on population health and community health assessment, including the CHNA, for first year medical students in a course on rural family medicine. Similar U.S.-based efforts appear in the literature and students perceive them as valuable. For example, Morehouse School of Medicine in Atlanta developed a year-long community health course in which first year students conducted a CHNA and implemented a related health promotion intervention [22]. In addition, the Harlem Residency in Family Medicine in New York city used CHNAs to teach residents community assessment and research skills [23]. The majority of residents reported improvement in their understanding of social determinants as well as increased comfort speaking to patients about social factors affecting their health. These efforts show that CHNA-related training for U.S. physicians is both feasible and impactful. Though the CHNA mandate tied to ACA is unique to the U.S., we expect that the integration of community health assessment content and related development of skills to analyze community health data would be possible and impactful in international LCPs as well. However, we could not find any published literature on CHNA curricula for physicians integrated within an early-year LCP or focused on rural population health. The curricular component we developed is focused on rural community health needs assessment and embedded within a rural longitudinal clinical preceptorship that begins in year 1 of medical school. The purpose of this paper is to describe the curricular component, its educational context and to present data on its effectiveness from a formative evaluation.

Methods

Created from a legislative mandate to train more rural family physicians, the University of Minnesota Medical School, Duluth Campus opened in September 1972 and more than 2000 physicians have graduated from medical school after completing their first two years in Duluth. The match rate into Family Medicine residencies is 48% and more than 40% of alumni practice in communities smaller than 20,000 population. The community health content was added to the year 1 Rural Medical Scholars Program (RMSP) course, which is an outgrowth and expansion of the Rural Family Medicine Preceptorship. RMSP is a spaced and longitudinal course required for all students. The relevant course objectives include: (1) understanding the impact of cultural diversities and their effect on health and the community; (2) ability to describe the elements of a community and community health assessment; (3) completion of an assessment of a rural community; and (4) understanding selected biostatistical concepts within the context of student-gathered community research data.

RMSP combines 2 weeks of on-campus learning activities with five separated weeks of immersive learning activities in a rural community during a 15-month period of the first- and second-years of the curriculum. Faculty assign each student to a rural preceptor in the upper Midwestern states of Minnesota or Wisconsin for these experiences. According to the typology of LCPs outlined in a recent review [8], RMSP is a “clinic attachment” LCP, in which students are assigned to the same preceptors and clinical settings over time.

In 2013–2014, we added new curricular elements to enhance medical students’ knowledge of the health of their assigned community. We added a 1-h lecture on Community Health Needs Assessments (CHNAs) required by the Affordable Care Act as well as more general approaches to community health assessment. This lecture was followed by a faculty-led review of three online databases containing community health information and one homework assignment, in which students retrieve data on the rural community of their assigned preceptor. The assignment requires students to retrieve data at the city and county levels using the U. S. Census Bureau’s American FactFinder, the Health Resources and Services Administration Data Warehouse and the Community Commons websites. Students find data on their assigned rural community’s demographics (e.g., proportion of population without health insurance), community social and structural characteristics (e.g., percent reporting poor social support, health professional shortages), health conditions (e.g., diabetes rates) and health behaviors (e.g., smoking rates). In addition, the assignment requires students to find and answer questions

about the CHNA of the rural hospital nearest their preceptor community. Each student then enters the information into an online Google Form, which populates a Google Sheet that is shared with the entire class for follow-up group discussion. The class debriefing sessions create opportunities for students to compare and contrast the CHNAs and health priorities of rural communities across the region. The CHNA curriculum is delivered in early December of the first year and all elements (from lecture to group discussion) occur within a week.

To evaluate this curricular component, we developed a brief pre/post survey and added CHNA-related questions to the mid-term and final exams. On the survey, students indicated the degree to which they agreed (strongly agree or agree) or disagreed (strongly disagree or disagree) with short statements assessing previous experience, awareness of resources, importance and requirements of community health assessments, and fit of session content with the course objectives (Table 1). The “pre” survey was administered before the CHNA lecture in the introductory session of the course in December and the “post” survey was administered during the last week of the first year RMSP course (approximately mid-June). Students were given time in class to complete each survey and participation was encouraged but optional. No incentives were offered for survey completion and there was no academic penalty for non-completion.

The survey was delivered via the medical school’s online curriculum management system. Three knowledge questions and several reading-based questions relevant to CHNAs were added to the final examination, which has questions covering clinical skills, other didactic sessions, and readings assigned on rural health. The University of Minnesota Institutional Review Board determined this study was exempt from review.

Survey data were collected for four consecutive years and exam questions were created in the latter two (2015–2016 and 2016–2017). The intention of the evaluation is twofold: (1) to ascertain baseline familiarity with CHNAs in first year medical students and (2) to measure changes in attitudes, understanding and skills involving CHNAs that occurred during the RMSP course. Because there were no significant pre-course or post-course differences by year of matriculation, we collapsed pretest data across all 4 years as well as posttest data to simplify analyses. Only participants who answered both surveys were included in this analysis. Likert-type scales were coded numerically and analyzed as ordinal variables. Because data were ordinal, nonparametric paired t-tests (Wilcoxon signed-rank tests) were used to test for a change in survey question responses from the pre- to the post-course survey. Mean changes and standard errors ($\bar{x} \pm se$) for Likert-type scales were also calculated, and the Likert-type responses are summarized as frequencies and

Table 1 Student pre- and post-course responses to survey questions aggregated over 4 academic years (n=210)

		Pre-course N (%)	Post-course N (%)	Pre-post Mean change \pm SE Z statistic
Outside of medical education, have you ever worked on a community health assessment project before?	No	175 (83.33%)	NA	–
	Yes, minor role	31 (14.76%)		
	Yes, major role	4 (1.90%)		
Indicate your level of familiarity with the online resources for community health information and data	Not familiar	148 (70.48%)	11 (5.24%)	0.88 \pm 0.05
	Somewhat familiar	52 (24.76%)	141 (67.14%)	Z = – 10.96***
	Very familiar	10 (4.76%)	58 (27.62%)	
At this point in my medical training, I can easily describe why a community health assessment is important ^a	Strongly disagree	7 (3.35%)	2 (0.95%)	0.61 \pm 0.05
	Disagree	61 (29.19%)	5 (2.38%)	Z = – 9.10***
	Agree	128 (61.24%)	128 (60.95%)	
	Strongly agree	13 (6.22%)	75 (35.71%)	
I understand how to plan and approach a community health assessment	Strongly disagree	29 (13.81%)	2 (0.95%)	0.99 \pm 0.05
	Disagree	139 (66.19%)	18 (8.57%)	Z = – 11.47***
	Agree	39 (18.57%)	154 (73.33%)	
	Strongly agree	3 (1.43%)	36 (17.14%)	
At this point in my training, I can explain what sorts of Community Health Assessments the ACA expects of hospitals and health systems in the future	Strongly disagree	60 (28.57%)	2 (0.95%)	1.12 \pm 0.05
	Disagree	124 (59.05%)	35 (16.67%)	Z = – 11.64***
	Agree	23 (10.95%)	140 (66.67%)	
	Strongly agree	3 (1.43%)	33 (15.71%)	
The material on community health assessment fits well with the overall course objectives	Strongly disagree	NA	3 (1.43%)	–
	Disagree		13 (6.19%)	
	Agree		152 (72.38%)	
	Strongly agree		42 (20.0%)	

***Wilcoxon signed-rank $p < .0001$

^aMissing n = 1 response, median change was 1.0 for all questions

proportions. SAS software v. 9.4 (SAS Institute Inc., Cary, NC) was used for analyses, and p -values < 0.05 were considered statistically significant.

Results

Survey participation by students was high: of the 252 students in the four sequential classes, 210 (83.3%) completed both the pre- and post-course surveys. Table 1 shows the survey questions and results. Before exposure to the new curriculum, very few students reported any previous experience with community health assessments (35/210, 16.7%). At the end of the first year course, we found significant changes in the distribution of student responses indicating improved learning on all four items (see Table 1). Specifically, on the post-course survey 199 students ($n = 210$, 94.8%) reported some familiarity with online resources for community health information compared with just 62 (29.5%) before the course. Interestingly, on the pre-course survey the majority (141/209, 67.5%) felt they could describe the importance of a community health assessment but disagreed or strongly disagreed (168/210, 80%) that they understood how to plan or approach one. By the end of the course, almost all students felt they could describe the importance of a community health assessment increased to (203/209, 97%) and the number of students who agreed or strongly agreed that they understood how to plan or approach a community health assessment increased from 42/210 (20%) to 190 (90.5%). The number of students who felt they were able to explain the ACA requirements of hospitals increased from 26/210 (12.4%) to 173 (82.4%). The majority (194/210, 92%) also felt that the CHA curricular component fit well with the RMSP course objectives.

The class exam results for the three test items directly related to the CHNA material show that the majority of students acquired the desired knowledge. Students did best on the questions covering ACA mandates (95% correct on average) and CHNA requirements (84.3% correct on average) but had difficulty with the more statistical/conceptual question on which data were available at which level of analysis (68.6% correct on average).

Discussion

This study provides preliminary evidence of effectiveness of an innovative curricular component focused on rural community health assessment. Most efforts to teach community and population health in medical school appear in later years and focus on non-rural contexts. First year medical students who received the CHNA curriculum reported significant changes in perceived awareness and skills over the course

period and performed well on exam questions. Further, the vast majority of students reported that this component fit well with the objectives of the rural longitudinal clinical preceptorship course. This suggests that a focus on community health assessment is not only impactful but well accepted by medical students early in training. Introducing this content earlier in medical school may better prepare medical students to meet the needs of rural communities [5] and may allow for greater engagement with the material than in later years when competing responsibilities increase [6]. We will continue to refine this curriculum and track closely the evolution of the Affordable Care Act requirements. We expect that it may be possible to incorporate similar community health assessment components in non-U.S. rural LCPs. Unlike the U.S., many countries have high quality, longitudinal, national health databases that can provide accurate and rich understanding of how rural communities are faring over time. Having access to such data would create a prime environment to study how introducing a community health assessment curriculum to the early years of medical school might affect the health of rural communities and long-term physician behaviors.

Importantly, the initial gap between understanding the importance of community health assessments and understanding how to plan or conduct one diminished substantially over the course. This suggests that first-year medical students are eager to learn community health assessment skills and capable of learning given the proper educational tools and environment.

It is likely that the observed student gains are in part attributable to integrating the curriculum in a unique, experiential rural preceptorship course. Our first-year medical students spend 5 weeks apprenticing with a rural preceptor, which gives them firsthand experience in rural community health assessment and reifies the classroom-based sessions. Though this is a valuable part of our curriculum, it is also unique in its early placement within the curriculum, its rural focus and its emphasis on the community health data. Future research may benefit from assessing the types of medical school courses most conducive to student training on community health assessment.

Our findings represent short term gains among several cohorts of first year medical students, but it is possible that early exposure to this kind of curriculum will have long-term effects on physician behaviors among graduates. For example, these students may be involved in community health assessments to different degrees than students of previous cohorts who were not trained to think critically about community health assessments in general or ACA-mandated CHNAs in particular. A follow-up cohort study comparing levels of CHNA engagement among physician graduates who were exposed to the curriculum vs. previous unexposed cohorts may be beneficial.

This study had several limitations worth noting. First, data was collected at one institution—a regional medical school campus—and it is not clear whether findings would hold across different medical schools. Second, this is a finite curricular component appearing in the first year of medical school and without reinforcement in later years. It may be that the observed gains dissipate over time as students learn new material. Third, the data collected represent students' perception of the knowledge and skills gained. While this is valuable in its own right, it would also be beneficial to collect data from other raters, for example instructors or preceptors.

There are three notable strengths of the present study. First, it presents preliminary data on a community health educational opportunity directly linked to a clinical experience in an underserved—specifically, rural—population. Classroom training empowers students to approach rural communities with more than a deficit-based approach, allowing them to identify strengths and make comparisons to other rural communities. Second, we analyzed pretest–posttest data from four consecutive cohorts of medical students. This allowed us to compare baseline student knowledge and skills across the years (there were no significant differences) and control for initial variance associated with posttest scores. As we continue developing and assessing the curriculum, we will be able to gauge whether changes in preparation for medical school (e.g., increased social and behavioral science content on the Medical College Admission Test [24]) affect incoming student knowledge of community health and related topics. Finally, an interdisciplinary team comprised of a community psychologist, family physician and social psychologist developed the curriculum. Collectively we have been involved with different aspects of rural community health and medical education for many years. This allowed us to identify impactful learning objectives for our first year students and successfully embed the community health curriculum within an established longitudinal clinical experience.

To strengthen and expand efforts to teach community and population health in the early years of medical school, it is important to consider involving new stakeholders and to reinforce early learning concurrently and longitudinally as students progress. Key goals include reinforcing dimensions of community health within basic science courses (e.g., using CHNAs to analyze community obesity rates in a cardiovascular course) and following community immersion experiences with topical discussions of community and population health. Reinforcing the curriculum over time would involve working with different courses and perhaps campuses to integrate important aspects of community health into later stage training. Finally, as community health assessments evolve over time, medical students will be able to ask deeper questions about them and analyze the quality

of mandated implementation plans to address needs identified in the CHNAs.

Conclusion

Increasing emphasis on links between medical practice and population health has sparked new approaches to teaching medical students about rural community and population health. Related curricular components may be a natural fit for integration within rural longitudinal clinical programs for first-year medical students. Further, it is likely that students will benefit from such community health assessment curricula. More efforts to develop medical students' skills in assessing rural community health are needed.

Acknowledgements We thank B. R. Balmer for editing assistance.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

References

1. Mak, D. B., & Plant, A. J. (2005). Reducing unmet needs: A pre-occupational medical training program in public health medicine and primary health care in remote Australia. *Australian Journal of Rural Health, 13*(3), 183–190.
2. Van Schalkwyk, S. C., Bezuidenhout, J., Conradie, H. H., et al. (2014). 'Going rural': Driving change through a rural medical education innovation. *Rural and Remote Health, 14*(2), 2493.
3. Zink, T., Center, B., Finstad, D., et al. (2010). Efforts to graduate more primary care physicians and physicians who will practice in rural areas: Examining outcomes from the University of Minnesota–Duluth and the Rural Physician Associate Program. *Academic Medicine, 85*(4), 599–604. <https://doi.org/10.1097/ACM.0b013e3181d2b537>.
4. Mak, D. B., & Mifflin, B. (2012). Living and working with the people of the bush: A foundation for rural and remote clinical placements in undergraduate medical education. *Medical Teacher, 34*(9), e603–e610. <https://doi.org/10.3109/0142159X.2012.670326>.
5. Deutchman, M. (2013) Medical school rural tracks in the USA. HRSA Policy Brief: U.S. Department of Health and Human Services, Health Resources and Services Administration, Federal Office of Rural Health Policy, September, 2013. Report No.: Grant U16RH03702.
6. Barrett, F. A., Lipsky, M. S., & Nawal Lutfiyya, M. (2011). The impact of rural training experiences on medical students: A critical review. *Academic Medicine, 86*(2), 259–263. <https://doi.org/10.1097/ACM.0b013e3182046387>.
7. de Villiers, M., Van Schalkwyk, S., Blitz, J., et al. (2017). Decentralised training for medical students: A scoping review. *BMC Medical Education, 17*(1), 196. <https://doi.org/10.1186/s12909-017-1050-9>.
8. Gheihman, G., Jun, T., Young, G. J., et al. (2018). A review of longitudinal clinical programs in US medical schools. *Medical*

- Education Online*, 23(1), 1444900. <https://doi.org/10.1080/10872981.2018.1444900>.
9. Maley, M., Worley, P., & Dent, J. (2009). Using rural and remote settings in the undergraduate medical curriculum: AMEE Guide No. 47. *Medical Teacher*, 31(11), 969–983. <https://doi.org/10.3109/01421590903111234>.
 10. Walters, L., Greenhill, J., Richards, J., et al. (2012). Outcomes of longitudinal integrated clinical placements for students, clinicians and society. *Medical Education*, 46(11), 1028–1041. <https://doi.org/10.1111/j.1365-2923.2012.04331.x>.
 11. Worley, P., Couper, I., Strasser, R., et al. (2016). A typology of longitudinal integrated clerkships. *Medical Education*, 50(9), 922–932. <https://doi.org/10.1111/medu.13084>.
 12. George, D. R., Beachy, W., Chan, J., Cameron, F., Trinkkeller, J., & Gonzalo, J. D. (2016). Teaching population health: Using the classroom as a bridge to the community. *Medical Teacher*, 38(11), 1182–1183. <https://doi.org/10.1080/0142159X.2016.1237015>.
 13. Hunt, J. B., Bonham, C., & Jones, L. (2011). Understanding the goals of service learning and community-based medical education: A systematic review. *Academic Medicine*, 86(2), 246–251. <https://doi.org/10.1097/ACM.0b013e3182046481>.
 14. Nickens, H. (1999). It's about time. The medicine public health initiative. *American Journal of Preventive Medicine*, 16(3), 20–21.
 15. Gruen, R. L., Pearson, S. D., & Brennan, T. A. (2004). Physician-citizens—Public roles and professional obligations. *Jama*, 291(1), 94–98. <https://doi.org/10.1001/jama.291.1.94>.
 16. Reiser, S. J. (1996). Medicine and public health: Pursuing a common destiny. *Jama*, 276(17), 1429–1430. <https://doi.org/10.1001/jama.1996.03540170073036>.
 17. Hoover, C., Wong, C., & Azzam, A. (2012). From primary care to public health: Using problem-based learning and the ecological model to teach public health to first year medical students. *Journal of Community Health*, 37(3), 647–652. <https://doi.org/10.1007/s10900-011-9495-y>.
 18. Mullan, F., Chen, C., Petterson, S., Kolsky, G., & Spagnola, M. (2010). The social mission of medical education: Ranking the schools. *Annals of Internal Medicine*, 152(12), 804–811. <https://doi.org/10.7326/0003-4819-152-12-201006150-00009>.
 19. Allan, J., Barwick, T. A., Cashman, S., et al. (2004). Clinical prevention and population health: Curriculum framework for health professions. *American Journal of Preventive Medicine*, 27(5), 471–476. <https://doi.org/10.1016/j.amepre.2004.08.010>.
 20. Englander, J. R., Cameron, A. T., Ballard, A. A., Dodge, A. J., Bull, A. J., & Aschenbrener, A. C. (2013). Toward a common taxonomy of competency domains for the health professions and competencies for physicians. *Academic Medicine*, 88(8), 1088–1094. <https://doi.org/10.1097/ACM.0b013e31829a3b2b>.
 21. Strokoff, S. L., & Grossman, E. G. Compilation of patient protection and affordable care act. Washington, DC: Office of the Legislative Counsel, U.S. House of Representatives June 9, 2010. Report No.: 42 U.S.C.18001.
 22. Buckner, A. V., Ndjakani, Y. D., Banks, B., & Blumenthal, D. S. (2010). Using service-learning to teach community health: The Morehouse School of Medicine community health course. *Academic Medicine*, 85(10), 1645–1651. <https://doi.org/10.1097/ACM.0b013e3181f08348>.
 23. Wilder, V., Gagnon, M., Olatunbosun, B., et al. (2016). Community health needs assessment as a teaching tool in a family medicine residency. *Family Medicine*, 48(8), 635–637.
 24. Kaplan, R. M., Satterfield, J. M., & Kington, R. S. (2012). Building a better physician—The case for the new MCAT. *The New England Journal of Medicine*, 366(14), 1265–1268. <https://doi.org/10.1056/NEJMp1113274>.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.