BRIEF
REPORTS

Integrating Quality Improvement and Community Engagement Education:

Curricular Evaluation of Resident Population Health Training

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BACKGROUND AND OBJECTIVES: The Accreditation Council for Graduate Medical Education requires all residents be trained in population health, but the most effective training strategies to impact care of patients and populations are not well established. The purpose of this study is to assess resident self-efficacy and expected application of population management skills through iterative experiential, longitudinal, team-based training in the office and community settings.

METHODS: Using a prospective longitudinal curricular evaluation, we surveyed residents at a single institution from 2014-2020, evaluating self-efficacy in population health skills as well as perceived impact on patient care and future practice. We collected surveys before and after participating in a 3-year, longitudinal, team-based, experiential population health curriculum that integrates clinic-based quality improvement and community engagement projects.

RESULTS: Fifty-nine of 68 residents (87%) responded to the presurvey, and 42/56 (75%) responded to the postsurvey. We observed significant increases in resident self-efficacy in all population health skills. All respondents reported finding common population health skills that were applicable in both office and community settings; 81% reported care of their continuity clinic patients changed because of taking part in the curriculum. Finally, 94% of respondents reported the intention to use population health skills and incorporate quality improvement (75%) and community engagement (100%) in future practice.

CONCLUSIONS: Teaching population health management skills in both office and community settings allows residents to integrate and apply these skills across settings and may enhance their use in patient care and future practice.

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Population health management is an essential component of the triple aim, which seeks to improve US health care through improving patient care experience, health of populations, and cost of health care.[1] The Accreditation Council for Graduate Medical Education (ACGME) competency-based Milestones,[2–4] Common Program Requirements,[5,6] and Clinical Learning Environment Review[7–9] recognize the importance of resident population health education. New strategies are needed to train physicians to lower health care costs and address the health care needs of communities. While there is consistent agreement regarding the importance of population health in residency training, the most effective teaching strategies and how these skills translate into clinical practice are less studied.

Research in residency training has shown that population health skills can be enhanced through a variety of teaching methods including a flipped classroom,[10] didactics,[11–14] workshops,[15,16] block rotations,[17,18] and real-world practice.[13,19] Current research has shown that residents value population health training that has a clear vision, valued resident contribution, dedicated time, faculty support, a structured curriculum, involves interprofessional teamwork, is experiential, longitudinal, and is horizontally integrated with the clinic and larger institution.[19–30] The majority of population health residency training literature has focused on resident quality improvement (QI) efforts within the clinic setting or hospital, with less research in education of residents in the community.

Community engagement (CE), is defined as "the process of working collaboratively with and through groups of people affiliated by geographic proximity, special interest, or similar situations to address

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issues affecting the well-being of those people."[31] Training residents in this discipline can address community health needs, allow residents to reach at-risk populations, expand the breadth of interdisciplinary teamwork, and increase exposure to social determinants of health.[32,33] Both CE and QI are founded on population management skills, including use of population data and plan-do-study-act (PDSA) cycles.[34] Offering residents longitudinal, experiential training in these skills via both community and clinic settings presents an opportunity to reinforce the broad applicability of these skills in current and future practice.

The purpose of this study is to assess resident self-efficacy and expected application of population management skills through iterative, experiential, longitudinal, team-based training in office and community settings.

Table 1: Self-Reported Demographics of All Residents Graduating in Years 2017 to 2022

Demographics		Overall Sample (N=47)
Gender	Male	18 (38%)
	Female	29 (62%)
Race/ethnicity	White	28 (60%)
	Latino	2 (4%)
	Pacific Asian	12 (26%)
	Black	4 (9%)
Geographic background	US born	40 (85%)
	Non-US born	7 (15%)
	Rural background	10 (21%)
	Urban background	37 (79%)
Training background	LCME osteopathic medical school	8 (17%)
	LCME allopathic medical school	34 (72%)
	International medical school	5 (11%)
Average age at start residency (years)		29

Abbreviation: LCME, Liaison Committee on Medical Education

Methods

This study was a prospective, longitudinal curricular evaluation of residents from one residency program at a single institution from 2014-2020. We collected pre- and postsurveys at orientation and before graduation. Two resident cohorts had classes of 12 residents each, with eight residents per class in each of the subsequent cohorts. Demographics that describe the residency program for residents with graduation dates between 2017-2022 are detailed in Table 1.

All residents participated in a required longitudinal curriculum that integrated QI and CE in team-based, experiential learning. Residents learned and used PDSA cycles, leadership skills, and community assessment through longitudinal projects both in the clinic and in partnership with organizations in the community. Table 2 presents a description and timeline of the curriculum.

We invited all residents to voluntarily participate in the survey evaluating self-efficacy—defined as someone's belief in their capacity to execute certain behaviors[35,36]—before and after completing the educational program. We structured questions to assess the degree to which learners found application for population health training in their clinical practice and future careers in accordance with the evaluation framework, based on the Kirkpatrick Model, for teaching population health in medical education proposed by Johnson, et al.[37] Self-efficacy has been shown to be a strong predictor of behavior change (Kirkpatrick level 3),[38] and has been used to assess likelihood of changing future practice among clinicians.[36,39] We performed data collection using REDCap (Research Electronic Data Capture).[40] We deidentified data for descriptive analysis. We used descriptive anlysis due to small sample size. Univariate statistical tests compared characteristics of residents who completed the survey. We used Student t tests to compare continuous characteristics and we used χ^2 tests to compare binary and categorical characteristics. The Penn State College of Medicine Institutional Review Board deemed this study exempt (STUDY#00002431).

Results

We collected survey responses annually from 2014 through 2020. Fifty-nine of 68 (87%) responded to the presurvey, and 42/56 (75%) responded to the postsurvey.

Table 3 summarizes resident self-efficacy in population health skills assessed at the start and end of residency. Significant increases were seen in the percentage of residents expressing confidence in all population health skills.

All respondents reported finding common population health skills that were applicable in both office and community settings, as shown in Table 4. Most (81%) reported that the care of continuity clinic patients had changed due to taking part in the curriculum. Finally, most respondents reported the intention to use population health skills and incorporate QI and CE in future practice.

Table 2: Description of Training in Community Engagement and Quality Improvement Training Throughout the Academic Year

Months	Core Components	Community Engagement	Quality Improvement
July-September	Meetings	• Quarterly meeting with PGY1-3 residents, faculty facilitators and key community staff analyzing last year's interventions and new intervention plans	• Monthly meetings with PGY1-3 residents, faculty facilitators and key clinic staff discussing projects and applying IHI concepts
	Concepts*	PGY1 • Public health • Children's health PGY2 • Community-oriented primary care • Biostatistics • Needs assessments • Health People 2030 PGY3 • Advocacy • Program evaluation and design • Grants • Community-engaged research	PGY1 IHI modules: • How to Improve with the Model for Improvement: Your Engine for Change PGY2 IHI modules: • Testing and Measuring Changes with PDSA Cycles • Interpreting Data: Run Charts, Control Charts, and Other Measurement Tools PGY3 IHI modules: • Introduction to Health Care Leadership • Leading Quality Improvement
	Activities (PLAN)	• PGY-1 residents visit variety of community organizations • PGY-2 residents self-identify a community partner • PGY-3 residents lead year-long community intervention • Resident teams identify a community-based intervention and key stakeholders • Begin community intervention	• Choose a clinical topic for QI • Pilot short cycle PDSA based on team chart audits • Review pilot PDSA baseline data • Identify primary performance measure and data source • Identify key stakeholders • Start run charts • Begin office-wide QI intervention
	Deliverables	• Submit schedule, designating a lead resident each month • Submit written reflections on readings	• Submit schedule, designating a lead resident each month • Submit project timeline
October-December	Meetings	• Quarterly meeting with PGY1-3 residents, faculty facilitators and key community staff analyzing project progress	• Monthly meetings with PGY1-3 residents, faculty facilitators and key clinic staff combining monthly project expectations and applying IHI concepts
	Concepts*	PGY1 • Socioecological Model • Social determinates of health PGY2 • Logic models • Cultural humility • Health literacy • Community health in the clinic PGY3 • Interdisciplinary teamwork • Health inequality • Public policy	PGY1 IHI modules completed: • Introduction to the Triple Aim for Populations • Dignity and Respect PGY2 IHI modules completed: • Improving Health Equity PGY3 IHI modules completed: • Quality, Cost, and Value in Health Care • Planning for Spread: From Local Improvements to System-Wide Change
	Activities (DO)	• PGY1 residents visit variety of local community organizations • Collect data	• Select process and balancing measures • Initiate workflows for primary clinical outcome and for secondary process outcome • Record data regularly (typically every 2 weeks)

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Table 2: Continued

Months	Core Components	Community Engagement	Quality Improvement
October-December	Deliverables	• Submit a team progress report • Submit written reflections on readings	• Submit IHI Charter Form • Present run chart analysis • Present interim outcomes, process, and balancing measures • Submit discussions of impact of social determinants of health on QI project and engagement of key stakeholders
January-March	Meetings	• Quarterly meeting with PGY1-3 residents, faculty facilitators and key community staff analyzing project results	• Monthly meetings with PGY1-3 residents, faculty facilitators and key clinic staff combining monthly project expectations and applying IHI concepts
	Concepts*	PGY1 • Community engagement PGY2 • Disease prevention and health promotion • Social determinants of health • Homelessness/free clinics PGY3 • Medial advocacy • QI in the community • Project sustainability	None
	Activities (STUDY)	• PGY1 residents visit variety of community organizations • Analyze intervention	• Report on interim process and balancing measurements • Make adjustments to ensure "do" portion of project completed in March
	Deliverables	• Submit written reflections on readings • Submit PDSA Report	• Present run chart data to faculty facilitators and office management • Submit discussion of what went well, challenges encountered, and potential improvements
April-June	Meetings	No meetings	No meetings
	Concepts	None	None
	Activities (ACT)	• PGY1 residents visit variety of community organizations • Analyze impact and effectiveness of intervention • Finalize analysis and poster presentation	• Analyze impact and effectiveness of intervention • Finalize analysis and poster presentation
	Deliverables	• Present work to colleagues and faculty in scholarly poster format	• Present work to colleagues and faculty in scholarly poster format

Abbreviations: IHI, Institute for Healthcare Improvement; PGY, postgraduate year; QI, quality improvement; PDSA, plan-do-study-act.

*Concepts are provided as reading resources and online modules in a flipped classroom educational framework.

Discussion

Our data support the effectiveness of this integrated curriculum in enhancing resident self-efficacy with population health skills, with a majority of respondents reporting that the curriculum has application to current and future practice. These results are in keeping with existing literature suggesting exposure to QI in training leads to increased implementation of QI into practice.[41] All respondents found common population health skills that were applicable in both the office and community settings. Previous work by Knox et al[42] demonstrated improved competency in related milestones and satisfaction among residents, but the translation of these skills between settings is a novel contribution to curricula in this area.

Limitations of this study include a small cohort at a single suburban

Table 3: Resident Self-efficacy in Population Health Skills

I Am Confident in…	Start of Residency	End of Residency	Difference*
Assessing the health of specific populations (eg, diabetics) within my practice	49%	91%	42%
Addressing the unmet social needs in the care of my patients	49%	89%	40%
Identifying social determinants of health	29%	81%	52%
Advocating for the health of my community	55%	79%	24%
Using a plan-do-study-act (PDSA) cycle to improve the care of your patients	20%	74%	54%
Assessing the health literacy of my patients	24%	72%	48%
Leading an interdisciplinary team	16%	67%	51%
Interpreting population based quality measures (eg, registries, chart audits) in the clinic	6%	67%	61%
Assessing community needs	6%	48%	42%
Knowledge regarding community resources for my patients	2%	43%	41%
Using biostatistics to characterize my community	2%	26%	24%

*All P values <.05 utilizing Student t tests.

All results above reflect the percentage of respondents who responded "a lot" or "a great deal" to each survey question.

Table 4: Resident Self-reported Current and Anticipated Future Application of Population Health Skills

	% of Yes Responses
Did you find any common population health skills that were applicable in both the office and community settings?	100
Has your care of patients in your continuity clinic changed as a result of your experience in the population health curriculum?	81
Have you learned any specific population health skills during residency that you plan to use in your future practice?	94
Has the population health curriculum increased your desire to incorporate quality improvement into future practice?	75
Has the population health curriculum increased your desire to engage with the community in future practice?	100

program and may not be generalizable to other programs and settings. During the 3-year training experience, multiple factors outside this curriculum may have also influenced the participants' responses.

Future studies may explore how exposure to a synergized QI and CE curriculum directly affects patient care outcomes, changes future practice, and impacts future population health behaviors.

Teaching population health management skills in both office and community settings allows residents to integrate and apply these skills across settings and may enhance their use in patient care and future practice.

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