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Impact of Integrating a Unified Population Health and Systems Thinking Curriculum into a PA Program

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Impact of Integrating a Unified Population Health and Systems Thinking Curriculum into a PA Program

Cover Page Footnote

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INTRODUCTION

Population health (PH) has become a major focus in healthcare in recent years.¹ PH focuses on the recognition of health outcomes and patterns of health determinants based upon policies and interventions.² But even as our understanding of PH grows and providers implement new and innovative best practices, the formal curriculum for learners in medicine can be slow to catch up.³ Though it can be difficult to implement changes, the benefit can be substantial for preparing future providers to think critically and work toward innovative patient-centered solutions early in their careers. This paper outlines the impact of curricular changes implemented for Physician Assistant (PA) students related to PH, and the effect this had on their knowledge and experience throughout their education at the Southern Illinois University School of Medicine (SIUSOM).

High-quality healthcare involves incorporating: 1) PH into primary care in conjunction with the collaboration and 2) teams of health professionals in order to provide earlier recognition of disease and aid in prevention.⁴ Interprofessional education (IPE) has been proposed by the World Health Organization as the key to interprofessional team functioning effectively and efficiently, by providing learners with collaborative opportunities during their medical education which allows them to experience and learn team-based quality care delivery.⁵ Working within a team to deliver care helps to expand services, provide coordination, improve patient outcomes and lower costs while promoting a more fulfilling practice.⁶

Working in interprofessional teams to leverage resources is even more crucial now with the substantial shortage of providers predicted for the health care system. According to the Association of American Medical Colleges, there will be an estimated shortage of between 21,200 and 55,200 primary care physicians by 2033.^{6,7} Unfortunately, the demand in underserved and rural communities is even greater.⁸ In addition to provider shortages, many primary care providers (PCPs) are overbooked and burned out, which results in too many patients and limited time to offer all the recommended services.^{9,10} In 2015, only 8.5% of adults over 34 years received all their most important clinical preventative services.¹¹ To address this barrier and the complexity of health care services needed, delivery of healthcare by teams of people is not only needed, but required to provide adequate care to patients according to a study conducted in 2012 by physicians with the University of California.¹⁰ Without the interprofessional support of nurses, lab techs, administrators, social workers and other PCPs, the panel of patients that a physician would be able to provide services to would be relatively small. It is estimated that a

primary care physician alone can only care for roughly 50-70% of the patient population compared to team-based care models.¹⁰

In addition to team-based care, patients and providers can benefit from utilizing a Systems Thinking approach to understand the connections among elements within and adjacent to the health care system.¹² Systems Thinking is the understanding of all the parts of the healthcare system and the ability to critically think about how these parts work together to impact patient's health.¹³ This approach helps to develop an increasingly deep understanding of underlying structure and can lead to highest impact interventions.¹⁴ Interprofessional teams utilizing a Systems Thinking approach can help providers advocate for a better health care delivery system on a broader scale.¹⁵ However, many medical school curricula lack targeted education in this area.³

In recognition of common goals to improve patient health through team-based and patient-centered care, the American Academy of Family Physicians and the American Academy of Physician Assistants offered a joint statement advocating for team-based care and encouraging IPE for medical students, family medicine residents, and Physician Assistant (PA) students during their medical education programs.¹⁶ Strategies for IPE are currently available and vary in the method of delivery from didactic courses to simulation events.¹⁷

SIUSOM serves a large area of central and southern Illinois and includes medically underserved and health professional shortage areas. SIUSOM faculty identified a gap in the education of providers serving this region due to a lack of organized PH and social determinants of health (SDOH) curriculum within our medical school, as well as the Family and Community Medicine (FCM) residency and PA programs. To address this gap, program faculty developed a unified population health and systems thinking curriculum and then integrated it into the SIUSOM PA program as well as within the FCM Residency and medical school curricula. PA students were surveyed throughout their 3-year program regarding their knowledge and experience of population health and systems thinking (PHST), and the importance of continued IPE among learners.

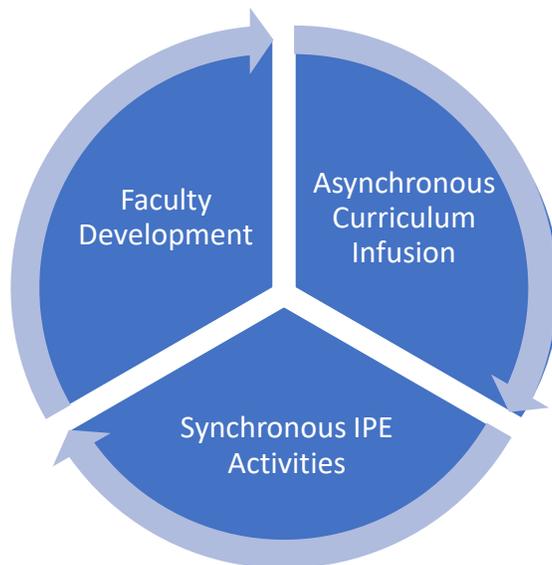
As noted by the Interprofessional Education Collaborative expert panel report, providers must address health care in the context of complex social and delivery systems, and recognize the limitations of professionals. Collaboration across professions, and integrated systems thinking approach are crucial to promote health and provide treatment at the population and

individual levels.¹⁸ Clinicians need to be highly trained in the breadth and depth of primary care and in innovative models to promote wellness, chronic illness management, patient safety, and cost-effectiveness while reducing health disparities. The proposed SIUSOM training model aimed to meet this goal by providing increased opportunities for learners to practice skills needed to care for underserved populations and cultivating the ability to think critically and creatively using a Systems Thinking approach.

METHODS

Healthcare Resources and Services Administration funded SIUSOM for a 5-year Primary Care Training and Enhancement grant to develop training for delivering high quality primary care. With this funding, the SIU Department of FCM developed a three-part plan that emphasized interprofessional learning as shown in Figure 1.

Figure 1: Population Health & Systems Thinking Model



Faculty development immersed key team members in the components of SDOH, systems thinking, and population health through a “train the trainer” model. Core trainings were administered to the grant leadership and then rolled out to other interprofessional teams at the residency hub sites.

Asynchronous Curriculum Infusion was accomplished after PA and residency curriculum were reviewed by trained faculty for opportunities to enhance learning. The PA curriculum was

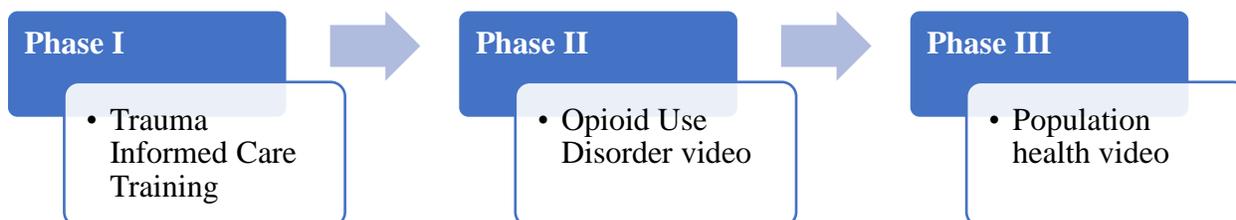
addressed by: reviewing curriculum, enhancing existing curriculum, and adding new activities. In the review stage, the 13 PHST educational objectives (Table 1) were compared with program guidelines to see where we were already addressing population health, where PH content could be enhanced or highlighted, and where new PH content could be developed.

Table 1: Description of 13 Educational Goals Used to Assess Student Knowledge and Experience.

Educational Goal	Description
1	Assess the health status of populations using available data (e.g., public health surveillance data, vital statistics, electronic health records and health plan claims data)
2	Discuss the role of socioeconomic, environmental, cultural, and other population-level determinants of health on the health status and health care of individuals and populations (e.g., language barriers, poverty, air pollution).
3	Integrate emerging information on individuals' biologic and genetic risk with population-level factors when deciding upon prevention and treatment options (e.g., prevention of birth defects and heritable disorders, improved understanding of populations particularly vulnerable to toxic environmental exposures).
4	Appraise the quality of the evidence of peer reviewed medical and public health literature and its implications at patient- and population- levels.
5	Apply primary (i.e., prevent disease or injury before it ever occurs: e.g., immunization, health education) and secondary (i.e., reduce impact of a disease or injury that has already occurred: e.g., screenings) prevention strategies that improve the health of individuals and populations.
6	Identify community assets and resources (e.g., public health departments, health clinics, after school programs, etc.) to improve the health of individuals and populations.
7	Explain how community-engagement strategies (i.e., local coalitions working collaboratively) may be used to improve the health of communities and to contribute to the reduction of health disparities (i.e., inequalities that occur in the provision of healthcare and access to healthcare across racial, ethnic and socioeconomic groups).
8	Participate in population health improvement strategies (e.g., systems and policy advocacy, program or policy development, or other community-based interventions).
9	Discuss the functions of public health systems, including those that require or benefit from the contribution of clinicians , such as public health surveillance, preparedness, and prevention of chronic conditions.
10	Describe the organization and financing of the U.S. health care system (e.g., hospital types, Federally Qualified Health Centers, public/private insurance) and their effects on access, utilization, and quality of care for individuals and populations.
11	Discuss the ethical implications of health care resource allocation and emerging technologies on population health (e.g., safety net programs, differential access to care).
12	Identify quality improvement methods (i.e., data-guided activities and analysis) to address system changes and improve medical care and population health.
13	Understand the scope of practice of health care team members (e.g., physicians, PAs, NPs, nurses, behavioral health professionals, community health workers, social workers).

The educational objectives were based upon 12 competencies/educational goals identified by Maeshiro et al. with one additional competency.¹⁹ Next, elements of the existing curriculum were enhanced by clearly delineating population health and SDOH topics. Finally, three new modules were added as shown in Figure 2.

Figure 2: Asynchronous Activities Added to the PA Curriculum.



Synchronous Interprofessional Educational Activities (IPE) Activities were developed to bring together PA students, residents and learners from other disciplines including social work, law, and nursing. Opportunities were found through two lecture series, patient home visits, memory clinic and six workshops including a poverty simulation.

A PHST Survey was developed and administered to PA students via paper or *SurveyMonkey*TM annually during the grant in order to measure the impact of the 3-part curricular plan. There were 22 items on the PHST Survey. Eight questions were asked about the specific program, graduation and FCM site. Students were asked to create a unique ID for anonymity. The remaining 14 questions surrounded the 13 educational goals (Table 1). The students were asked to rate the educational goals based on the following criteria: 1) current level of knowledge, 2) importance in training medical professionals, and 3) current level of skill/experience in implementing the goal in practice. They were asked to respond yes/no to “need more training”. The survey included responses from PA students across all 3 phases of education who attended SIUSOM. The study was determined as non-human subjects research by the Springfield Committee for Research Involving Human Subjects.

Statistical analysis was performed using Statistical Analysis Software (SAS)©, version 9.4. All data variables were dichotomous, categorical or ordinal, except for student unique identifier. Data was treated independently. Linear associations were assessed between PA phase (I, II, or III) and knowledge/experience in the 13 educational goals, as well as likelihood of choosing to

practice in primary care, using a Mantel-Haenszel test. A Cochran-Armitage test for trend was used to determine if there was a linear trend across phase in the proportion of students reporting that they needed more training.

RESULTS

A total of 193 individual PA students responded to the PHST survey between spring 2017 and spring 2020, resulting in 294 student responses. The following results summarize findings from the 294 student responses. The average response rate was 91.4% across all years with the lowest individual survey response rate of 72.5%. Of the 294 PA responses included in the analysis, 143 (36.3%) were phase I, 150 (38.1%) were phase II, and 101 (25.6%) were phase III. 43.7% of students reported that they would likely choose a career in primary care. This analysis focused on PA knowledge, experience and training regarding 13 PHST educational goals. Importance was also measured, and 98.2% of PA responses reported “some” or “substantial” importance for all 13 educational goals.

Comparisons among PA Phases were made. Students reporting their likeliness of choosing primary care significantly increased from 40% in phase I to 54% in phase III ($p = 0.0073$). All 13 educational goals significantly improved in both knowledge of and experience in PHST educational goals over the PA Phases (see Table 2). Across all 13 educational goals, 44% of phase I students reported having no current knowledge in the educational goals. This reduced to 20% of phase II and 13% of phase III, while at the same time students reporting some and substantial knowledge increased. A similar trend was seen with experience.

Over 50% of Phase I students reported having no current knowledge in educational goals 7 through 12. By phase III, the percentage of students reporting no knowledge in these six educational goals decreased on average by 59% compared to Phase I. This same trend was seen regarding experience level for these 6 educational goals with over 65% of Phase I students reporting no current skill/experience in the 6 educational goals. A similar decrease was seen by Phase III with an average drop of 58% compared to phase I. In addition, 69% of Phase I students reported no current skill or experience in educational goal 3, dropping to only 18% by phase III.

Students reported being more knowledgeable and experienced with educational goal 13. 75% of students reported substantial knowledge and 51% reported substantial experience by phase III, showing increases of 181 and 240% from phase I, respectively.

Table 2: Student's Reported Knowledge and Experience with the 13-Population Health and Systems Thinking Educational Goals by PA Phase.

	Knowledge			Experience		
	Phase I (N=43)	Phase II (N=150)	Phase III (N=101)	Phase I (N=43)	Phase II (N=150)	Phase III (N=101)
Educational Goal	%	%	%	%	%	%
Goal 1						
None	47	14	2	52	35	10
Some	49	76	84	45	58	83
Substantial	4	10	14	2	7	7
Goal 2						
None	23	3	3	38	17	6
Some	66	74	70	53	71	83
Substantial	10	23	27	8	12	11
Goal 3						
None	50	11	9	69	41	18
Some	47	79	73	28	49	76
Substantial	3	11	18	3	10	6
Goal 4						
None	35	12	10	41	26	12
Some	55	68	66	52	61	69
Substantial	10	20	24	7	13	19
Goal 5						
None	19	1	0	31	5	1
Some	70	70	55	62	82	70
Substantial	11	29	45	7	13	29
Goal 6						
None	44	13	6	54	24	16
Some	46	71	75	39	67	75
Substantial	10	15	19	7	9	9
Goal 7						
None	57	26	18	67	37	23
Some	37	66	71	29	55	72
Substantial	6	8	11	4	7	5
Goal 8						
None	56	35	27	68	53	34
Some	39	59	64	29	41	61
Substantial	5	6	9	3	7	5
Goal 9						
None	58	23	16	70	35	22
Some	38	69	67	25	59	70
Substantial	4	8	17	4	5	8
Goal 10						
None	56	41	24	70	59	26
Some	39	53	66	26	35	70
Substantial	5	6	10	4	6	4
Goal 11						
None	52	43	28	69	57	31
Some	43	50	58	27	35	60
Substantial	6	7	14	4	8	9

Table 3: Student's Reported Knowledge and Experience with the 13-Population Health and Systems Thinking Educational Goals by PA Phase, continued.

	Knowledge			Experience		
	Phase I (N=43)	Phase II (N=150)	Phase III (N=101)	Phase I (N=43)	Phase II (N=150)	Phase III (N=101)
Goal 12						
None	71	41	30	75	60	41
Some	27	53	61	23	34	56
Substantial	2	7	9	2	6	3
Goal 13						
None	6	1	1	17	3	1
Some	67	49	23	68	65	48
Substantial	27	49	76	15	31	51

Note: all educational goals significantly improved across the three phases with a $p < 0.0001$

Additional Training There was a significant decreasing trend in students reporting that they needed additional training in all 13 educational goals from phase I to phase III with the largest drop between phase I and II (see Table 3). However, an average of 75.3% of phase III students still reported needing additional training across all 13 educational goals.

Table 4: Student's Response to Needing Additional Training in Educational Objectives by PA Phase.

Educational Goal	Additional Training						
	Phase I (N = 143)		Phase II (N=150)		Phase III (N=101)		p
	N	%	N	%	N	%	
Goal 1	130	98.5	111	86.7	62	74.7	<0.0001
Goal 2	128	96.2	97	75.2	54	67.5	<0.0001
Goal 3	129	98.5	114	87.7	68	81.9	<0.0001
Goal 4	122	96.8	85	65.4	58	69.1	<0.0001
Goal 5	132	98.5	97	74.1	50	64.9	<0.0001
Goal 6	131	97.8	110	81.5	68	80.0	<0.0001
Goal 7	129	98.5	114	84.4	65	77.4	<0.0001
Goal 8	128	97.7	119	85.0	75	87.2	0.0041
Goal 9	131	97.8	119	86.2	67	79.8	<0.0001
Goal 10	136	99.3	130	92.2	74	88.1	0.0005
Goal 11	128	97.7	127	90.7	65	81.3	<0.0001
Goal 12	129	98.5	118	86.1	72	81.8	<0.0001
Goal 13	125	96.9	75	60.5	33	45.2	<0.0001

DISCUSSION

The new and enhanced curriculum delivered through problem-based learning in the PA program, along with IPE activities, was effective in providing experiences and applying the knowledge surrounding PHST. PA students reported significant increases in their knowledge and experience in the PHST educational goals from phase I to phase III. However, students reported feeling more knowledgeable about the educational goals than they did in possessing the appropriate level of skill or experience to implement into practice by the end of Phase III of the PA program. This was reflected in 3 out of 4 phase III students reporting the need or want for additional training to better prepare them for direct patient care. Overall, the students recognized the need for additional training and welcomed the opportunity to enhance their knowledge and experience.

These results are consistent with other educational strategies aimed to improve health promotion and public health education for PA students.²⁰ PA students reported a high level of importance and improvement in both knowledge and experience related to PHST topics. For several decades there has been a push towards implementing the Healthy People goals. Specifically, the goal of increasing the prevention content of clinical health professional education.²¹ The Healthy People initiative is released every decade by the federal government to guide national health promotion with statements of national health objectives for the most noteworthy preventable threats to health, and the established goals to reduce those threats.²² Healthy People 2020 includes tracking core clinical prevention and population health content in the training of health care professionals, and Healthy People 2030 specifically addresses the inclusion of interprofessional prevention education in the curricula of health professions program.^{11, 23} These findings help validate the need for continued education and training to ensure that students are being fully trained and prepared to care for all patients in all settings and recognize the importance of population based SDOH in the well-being of patients.

Overall, this project had several strengths. The PHST survey was required by the PA program administration resulting in a very high response rate. The survey was multi-faceted and covered many PHST topics outlined in the well-established 13 educational goals. There were also several limitations. Faculty did not all receive the same in-depth training resulting in variation of PHST content delivered. Responses during coronavirus disease 2019 (COVID-19) were excluded due to disruption in curriculum delivery. Lastly, confusion with the unique identifier questions affected the ability to link individual survey responses. However, significant

changes across the three PA phases were still shown even with the loss in power, supporting the reported success in the delivery of the curriculum.

The integration of PHST in the education of future clinicians is extremely vital for continued efforts in improving health outcomes for all patients, especially vulnerable populations. In the aftermath of COVID-19, the presence of health disparities has become even more apparent. In order to address these disparities, clinicians need to be equipped with the knowledge and experience to provide the care necessary to achieve optimal population health outcomes. Rather than asking even more of providers already at risk of burnout, the SIUSOM PHST curriculum emphasizes interprofessional collaboration to work within overlapping complex systems and to think creatively for improvement. Outcomes of this model will be invaluable to the communities served by SIUSOM training programs and graduates.

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