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INNOVATION HIGHLIGHT

Development of a Certificate in Health Care Improvement for Interprofessional Teams

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Introduction: To address gaps in care team education on improvement science and connect geographically dispersed learners, we created a certificate program for health care improvement for interprofessional (IP) health care teams, including third-year medical students.

Methods: This hybrid learning program consists of 5 modules: Learning Healthcare Systems, Improvement Science, Patient Safety and Diagnostic Error, Population Health and Health Equity, and Leading Change. The curricular materials comprise focused readings, concise videos, faculty-moderated discussion boards, weekly synchronous calls between participants and faculty, and a longitudinal improvement project. The faculty are content experts who worked with a curriculum designer to define learning objectives and develop content.

Results: We completed this 6-month program in cycles over 3 years, training 61 participants (including 17 medical students) at 14 sites. In the third year, several medical students participated without an IP team. Development of the materials has been iterative based on feedback from learners and faculty.

Discussion: We demonstrate the development and rollout of a hybrid learning program for diverse and geographically dispersed IP teams, including medical students. Time restrictions limited the depth of topics, and scheduling overlap caused some participants to miss the interactive calls. We will evaluate the use of the program for participants over time using qualitative methods.

Conclusions: This educational model is feasible for IP teams studying improvement science and implementing change projects. Further, it can be adapted to dispersed geographic settings.

Keywords: improvement science, interprofessional education, quality, patient safety, population health

The Accreditation Council for Graduate Medical Education (ACGME) included expectations for competency in "practice-based learning and improvement" and "systems-based practice" for professional development of physicians.[1] Subsequently, residency programs and medical schools developed quality improvement programs to prepare trainees under this mandate.[2,3] The ACGME expanded the promotion of quality and safety by adding the Clinical Learning Environment Review (CLER)[4] program in teaching hospitals. Interprofessional (IP) education is an important part of these initiatives, as longitudinal IP collaboration builds a foundation for professional collaboration and improved patient care.[5,6]

The impetus for educating medical professionals in these areas emanates from research in interrelated subjects, including health care variation and waste,[7-9] health care disparities and equity,[10,11]

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Institute of Medicine reports on medical errors,[12,13] implementation science,[14,15] and a growing understanding of the importance of IP training.[6,16-18] These studies suggest a need for greater systemic training in health care improvement. Inspired by these studies, physician-educators and researchers from Maine Medical Center (MMC), Tufts University School of Medicine (TUSM), and The Dartmouth Institute (TDI) partnered in 2017 to develop a Certificate in Healthcare Improvement program for IP teams throughout the state of Maine. The program was housed at TDI for the first 2 years and then moved to MMC.

The Certificate provides a platform for IP health care teams across Maine, a wide geographic area with a range of health care disparities and variation in care delivery, to learn key concepts in improvement science, errors, safety, population health, and institutional leadership. This learning occurs while the team develops and implements a quality improvement project related to their clinical context. This model is particularly relevant in areas with a distributed IP faculty that needs continuing professional development, and with a shortage of faculty with experience teaching non-clinical content. Medical students are integrated into the IP team to strengthen their education in health care improvement and IP learning, and to provide a clinical perspective. In this paper, we share this novel approach to collaboratively expanding quality improvement and IP education, and we provide a guide for replicating the program in other geographically dispersed settings.

METHODS

Content development

MMC and TDI developed the program with resources from TDI and its online program for obtaining a masters of public health.[19] Select hospitals participating in the Longitudinal Integrated Clerkship (LIC) of the MMC-TUSM Maine Track were initially approached. In these LICs, third-year medical students perform their longitudinal core clerkships, often in rural settings, and participate in IP care.[20] The content is annually delivered from August to February, matching the academic calendar of the LIC, but allowing students time to integrate with their teams in June and July. Hospitals and other clinical teams without medical student learners may also participate based on their interest in learning and benefiting from this experience.

Co-faculty leads with content expertise collaborate to define the learning objectives and curriculum for each of the 5 modules through an iterative process (Table 1). Instructional designers from TDI and MMC worked with faculty to create 8 to 15-minute videos in the flipped classroom model, select key readings, plan discussion-board prompts, and design interactive synchronous sessions. The curriculum is reviewed and updated each academic year based on participant and faculty feedback. The program content is hosted on an online learning management system (Canvas; Instructure, Inc).

Site selection and implementation

Site recruitment focuses on Maine sites that host LIC students and local partners focused on health care access. Hospitals with LIC students are chosen based on established relationships and the desire to have IP teams that include medical students. The program faculty visit each potential site to learn their opportunities and challenges, and to determine whether the program is a good fit. Program faculty work with site leaders, who are encouraged to invite participants from different disciplines, including clinicians, researchers, and administrators. Program site diversity has varied from an inpatient general medicine service in Northern Maine to ambulatory public health and hospital-based sub-specialty clinics in Portland (Supplementary Table).

The certificate program consists of 5 modules, each lasting 3-6 weeks (Figure 1 and Table 1). Each week includes 2-3 readings, 1-2 concise videos, an interactive synchronous session led by faculty via Zoom video conferencing software (Zoom Video Communications, Inc), and an assignment. The assignment can be an individual or team activity, or participation in an online conversation hosted on the Canvas discussion board. The format of this board includes a weekly query, with posted responses of approximately 150 words expected from each participant. The faculty for each module respond to the posts, which often stimulates interaction during the synchronous session. Participants spend approximately 2-3 hours each week reviewing material and completing assignments, and 1 hour on the synchronous Zoom session, which is recorded for those who cannot participate live.

The course faculty formally adapt the course structure each year. Based on feedback described in the results section, Module 1 became self-directed

with no interactive synchronous sessions. This module occurs in the summer and team members often require schedule flexibility at that time. Module 1 was also changed from a focus on health care variation to “Learning Healthcare Systems” to broaden the knowledge base. This change made the module more relevant to the IP teams while still including information about the science of practice variation. In the third program year, the “Leading Change” module was distributed within the other 4 modules as intersessions; the faculty wanted to emphasize the importance of leadership in all the modules to improve care delivery and health equity. Also, because medical students transition out of their LIC in early March, they could not participate in some of the leadership content in the first 2 years.

Throughout the certificate program, each group or individual completes a longitudinal improvement project. Weekly assignments during the Improvement Science module help participants develop and refine their project. Faculty from the module and specialists in improving health care performance are available to help design the projects. After completing the program, the participants continue to have access to the improvement specialists. Some projects that were developed during the course include: implementing a pharmacist-lead program for medication education at hospital discharge for patients with chronic obstructive pulmonary disease; improving recycling processes at a MaineHealth non-clinical site; improving follow-up of patients with positive testing for sexually transmitted illnesses; improving supply preparation and distribution in the emergency department; and increasing community involvement in initiatives to improve exercise and food options in a rural community with high obesity rates.

To facilitate IP collaboration, the program is promoted as a team effort. An ideal team consists of LIC medical students, a physician-faculty member, a non-physician clinician (e.g., nursing, pharmacy, physical therapy), and a quality leader. The goal is to have IP teams at each site while limiting overall enrollment to support efficient education and collaboration. However, individual medical students participating in the LIC may participate and receive 2 weeks of elective credit. Independent medical students completed the online educational components and an improvement project with an IP team at their sites. These students also gain IP perspective during the synchronous meetings. Continuing education credit is awarded to participants, totaling 78 hours.

Evaluation

We evaluated the impact of the content and course logistics, including website interaction and time spent on homework and class preparation. The evaluation was done through informal discussions with participants and non-anonymous quantitative surveys developed locally and distributed after each module. Example questions in the surveys included such topic areas as ability to integrate content into their current work, which components of the content were most and least valuable, and amount of time spent on the Certificate per week. In lieu of a final overall survey, the course director conducted informal exit interviews with the participants during a luncheon where they were given course completion certificates.

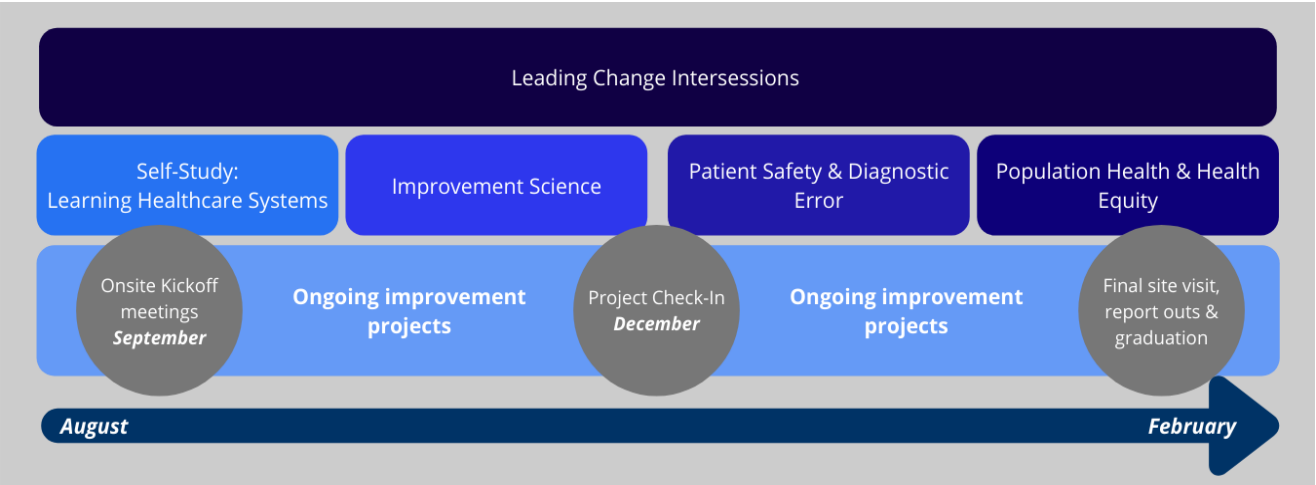

Figure 1. Current Structure of the Certificate in Healthcare Improvement

Table 1. Learning Objectives, Certificate in Health Care Improvement.

Module	Weekly topics	Learning objectives
Learning Healthcare Systems	Introduction to Learning Health Care Systems and Practice Variation	• Characterize a learning health care system • Discuss foundations of a learning health care system • Integrate the idea of a learning health care system with the problem of practice variation and improving care delivery
	Preference Sensitive Care	• Recognize the importance of medical opinion in practice variation • Understand the importance of transparency in rates of medical and surgical care in solving practice variation • Identify the basic steps of shared decision-making in preference sensitive care
	Strategies for Reducing Practice Variation in a Learning Health Care System	• Understand how learning health care systems can reduce practice variation • Recognize solutions for each type of practice variation • Learn to mobilize interprofessional teams in learning health care systems to reduce practice variation
Improvement Science	Data-Based Decision-Making	• Understand the history of performance improvement • Recognize how data drives performance improvement • Structure data to drive improvement
	Identifying Waste	• Describe the 8 wastes • Carry out a waste walk • Critique key findings from a waste walk related to 8 wastes
	Process Thinking	• Define a process in the context of health care • Characterize a process using a SIPOC
	Root Cause Analysis	• Actively participate in a root cause analysis • Apply the *5 Whys* root cause tool to improve project planning
	Solution and Consensus Building	• Identify potential solutions and work with a team to prioritize solutions for implementation
	Continuous Improvement	• Describe how to check results of improvement activities • Recognize the importance of standardizing best practices • Apply continuous improvement principles to care delivery

Table 1. Learning Objectives, Certificate in Health Care Improvement. (continued)

Patient Safety and Diagnostic Error	Introduction to Patient Safety	• Recognize why patient safety is important in health care • Discriminate differences between medical errors and adverse events • Describe the importance of designing systems of care with human factors and principles in mind • Contrast common strategies for preventing medical errors and adverse events • Judge the importance of systematically analyzing and learning from medical errors and adverse events • Define the key domains for assessing patient safety • Distinguish between the commonly used measures of patient safety • Describe the importance of culture and leadership in patient safety
	Creating a Culture of Safety	• Describe the key attributes of psychological safety • Contrast leader and team roles in providing an environment of psychological safety • Explain what fair and just culture means in terms of non-punitive response to error and accountability for learning from preventable adverse events • Relate James Reason's algorithm for Unsafe Acts to actual events • List ways to promote a positive safety culture • Recognize the importance and challenges of safety event reporting
	Patient Safety Toolkit	• Describe the components of a root cause analysis • Identify patient-safety action plans in terms of the strength of the intervention • Discuss the importance of measurement in safety improvement • Describe the components of a FMEA • Relate the FMEA process to a sample case • Discuss the importance of transparency and sharing lessons learned from adverse events
	Science of Diagnostic Error	• Define diagnostic error • Describe the prevalence of diagnostic error • Explain the impact of diagnostic error on patients, clinicians, medical institutions, and society • Identify the common systems and cognitive contributors to diagnostic errors
	Reducing Diagnostic Error	• List methods for identifying diagnostic errors and the advantages and disadvantages of each method • Describe methods for engaging stakeholders (patients, clinicians, nurses, administration, boards) in decreasing diagnostic error • Construct a way to decrease common systems-based causes of diagnostic error • Identify methods for decreasing common cognitive causes of diagnostic error • Compare methods for providing feedback on diagnostic performance to clinicians and institutions
	Public Reporting of Quality Measures	• Recognize what motivates agencies to report on quality • Understand what motivates providers to report on quality • Discuss how consumers can assess quality of their provider or health care organization • Critique the overall effect of public reporting on quality

Table 1. Learning Objectives, Certificate in Health Care Improvement. (continued)

Population Health and Health Equity	Overview of Population Health	• Define population health and its relationship to health care delivery • Differentiate the 3 buckets of prevention as they relate to population health
	Social Determinants of Health and Health Equity	• Understand why social determinants of health must be integrated into clinical practice • Identify the essential elements of health equity
	Using Data to Understand Population Health	• Identify the various data sources for measuring population health at the international, national, and county levels • Critique and interpret metrics for your county compared with another county in Maine
	How Community Health Needs Assessments Inform Population Health Planning and Implementation	• Locate and unpack Community Health Needs Assessment reports and understand how our local communities and patients are struggling • Construct examples of case studies of successful interventions to inform strategic interventions in population health
	Strategic Partnerships to Improve Population Health	• Identify the roles of anchor institutions in improving population health • Differentiate between social, political, and economic factors that may influence a patient's health and health care
Leading Change	How Health Care is Organized and Financed	• Develop a foundational understanding of US health care organization and financing applied to health and health care in your community • Compare and contrast US health care organization and financing between 13 high-income countries • Develop access to health care organization with peer-reviewed experts and financing knowledge and skills • Develop methods to apply knowledge and skills gained to ongoing initiatives at your institution
	Leading Ourselves – Empathy, Listening, Humility, Resilience	• Within the Maine communities where you live and work, learn about individual leadership, beginning with your inward journey • Understand your role, as an individual and as a team member, in transforming health care in your community • Describe important attributes of servant leadership and how you might see yourself as a leader • Envision, as a leader, a project in which you will contribute to improving health and healthccare in your community
	Building a Leadership Team	• Discuss building leadership in advocacy and quality improvement
	Disruptive Innovation in Health Care	• Understand disruptive innovation • Discuss reasons why health care may be ripe for disruptive innovation and benefit from such changes in your discipline or profession
	Strategies to Implement and Sustain Change	• Develop strategies for positive organizational change focused on health care improvement
	Engaging Internal and External Audiences	• Describe methods for engagement within your health center to improve care • Understand how leaders can engage the community to improve care delivery

FMEA, Failure Mode & Effectives Analysis; SIPOC, Supplies, Inputs, Process, Outputs and Customers.

RESULTS

Participants reported that they found the content engaging, interesting, and relevant to their clinical education. Across all modules, most participants said that the weekly time commitment was 2-3 hours, the material was helpful and informative, the live sessions were helpful to integrate information, and the faculty were supportive. Logistically, the online interface was easy to use. During the exit interviews, the medical students all stated that most of the content was not taught elsewhere in their medical school curriculum. The first course year, some non-physician participants reported that the content on health care variation did not seem relevant to their work, leading to the changes described in the Methods section.

The second year included the highest number of participants (31), a challenge for faculty interacting with the participants via the discussion board and synchronous sessions. In the 2019-2020 cycle, medical students participated without IP teams, which was challenging. In that cycle, we had greater attrition, with 3 students dropping the program in the fall, and 3 more completing the work after they finished the LIC program.

DISCUSSION

The Certificate in Healthcare Improvement is intended to meet a need to incorporate practice-based learning and improvement into health care training for medical students and IP teams. The program is led by a program director, faculty with content expertise, and key stakeholders in medical education. At the end of each course year, the curriculum is updated based on participant feedback.

There are several limitations of this program design. The depth of each topic is limited, given the other professional demands and clinical load of both faculty and participants, including medical students. Conflicting schedules limited some medical students' attendance to the interactive sessions. The mix of health professionals participating in IP groups varied at each site and likely influenced the participant experience.

Our next steps include expanding the geography of the program site and diversity of the IP teams. We also want to limit enrollment to 25 participants per year to preserve the faculty/participant interactions, a valuable programming component. We plan to engage alumni to learn if and how they are continuing to use the tools and skills they learned in their improvement program. We also plan to perform a more rigorous qualitative assessment of participants using semi-structured in-depth interviews.

CONCLUSIONS

The Certificate in Health Care Improvement arose from a need to improve IP team training in geographically dispersed and diverse health care settings. Feedback from the first 3 program years will enhance the content and participant experience moving forward. We anticipate that we will continue to increase the ability of our health care teams to apply rigorous methods to understand and improve the care they provide, as well as to recognize and respond to the health care needs of their communities. Through our work, we hope to establish a network of Maine centers doing similar work. We will expand the program to additional LIC sites across Maine and engage alumni in future work regarding health care improvement. Early evaluation from module surveys and exit interviews demonstrate a self-reported knowledge gain. Thus, this hybrid learning model, which includes both online material and synchronous meetings, has better trained IP teams in health care improvement and may be a replicable model elsewhere.

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