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Coproduction in medical education during the COVID-19 pandemic: critical components of successful curricular reform

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Abstract

The current coronavirus disease 2019 pandemic has greatly affected medical education in unanticipated ways. By introducing the concept of educational coproduction at our institution, we have maintained a flexible and productive curricular environment for all students. The notion of coproduction acknowledges that education is a service that requires recognition of the expertise that both the teacher and the learner bring to the table, in the context of their community and society writ large. Using the coproduction framework allowed for increased communication and improved partnerships among students, educators, clinicians and our community as well as adaptations to a rapidly changing educational environment. Embracing the idea of coproduction is a valuable concept for institutions to consider during this time and in the future post-pandemic period.

Key words: pandemic, COVID-19, health professional education, medical education, coproduction, communication

Introduction

At the end of 2019 epidemiologists began alerting the world to a novel viral pneumonia in the Hubei region of the People's Republic of China. Soon after, the virus was identified as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2; aka coronavirus disease 2019 or COVID-19) by the World Health Organization (WHO), and on 11 March 2020 the WHO declared COVID-19 as a global pandemic [1]. On March 6 Minnesota's Department of Health reported the first confirmed case in the state [2]. In response to the predictive modelling for the state, on March 11, the President of the University of Minnesota ordered the medical school to switch to an alternative education model without in-person instruction, including the removal of students from clinical rotations.

The pandemic has upended traditional medical education efforts by medical schools across the country. The Association of American Medical Colleges and the Liaison Committee for Medical Education recommended the removal of students from the clinical environment in March 2020, and students are only now slowly re-entering the clinical space many months later. These recommendations were based on the potential risk to patients, staff and students; limited supply of personal protective equipment; and concerns about availability of clinical preceptors. State governments have issued shelter in place orders that prevent students from travelling to hospitals and clinics [3, 4]. As a result, there have been great changes in medical education across the USA during the COVID-19 pandemic. By April 8, over 80% of US medical schools had removed third- and fourth-year students from clinical rotations [5]. Some schools, particularly those in the COVID-19 epicentres, promoted fourth-year medical students to interns and expedited graduation to increase the local workforce.

Uncertainty about how schools should structure medical education in the time of COVID-19 created a complex challenge [6].

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How do schools ensure students continue to develop the skills and knowledge necessary for their role as physicians, remain continuously enrolled, and be empowered to choose credit-bearing experiences that respect their desires to be of service during a pandemic? Most prior reports of the impact of COVID-19 on medical education have focused on either educator-specific suggestions [7–9] or student perspectives [10–12], without a focus on student–educator partnerships in creating solutions to this complex problem.

The present article describes our institution's approach to medical education during the pandemic, using a coproduction model. The concept of coproduction was initially introduced by Victor Fuchs in 1968 as it related to the service economy, with Elinor and Vincent Ostrom later contributing additional insight to the coproduction of goods and services [13, 14]. Decades later, the public administration and community have continued to build coproduction scholarship and use it in various applied settings. In 2016, Batalden *et al.* noted that although coproduction was borne out of the service industry, there was great potential to apply this concept to specific healthcare service settings [15]. Earlier this year, Englander and colleagues took this one step further and described how coproduction is a promising framework that could be used in health professions education [16]. Professional education coproduction provides a model framework to bring the diverse talents and passions of faculty and students together to tackle this complex challenge and serve the local community and society as a whole. In this report we review the concept of coproduction, provide our institution's approach to coproduction in education during the COVID-19 pandemic, review early outcomes of these changes, and discuss how this model is a valuable educational tool for the post-pandemic future.

Coproduction background

In the past few decades there has been a shift in how health care is conceptualized. The movement has been away from a traditional paternalistic model of health care where health is a good produced for patients by providers (a goods-dominant model) to a service-dominant model in which healthcare services are mutually produced by the interactions between patients and professionals. Batalden *et al*. described a model of 'coproduction of healthcare service' [13]. In this model, patients and providers work together to provide service for optimal outcomes, in the context of the patient's needs, their community and the greater society in which they live. Both the patient and the physician bring expertise to the relationship. The physician has expertise in medicine while the patient has expertise in the context of their lives and lived experiences. The model builds on the reality that the 'health' of the person, sometimes known as 'patient', cannot really be delegated to anyone else. This new model of healthcare coproduction does not yet have a well-established counterpart in medical education, which often remains a top-down process where administration and faculty deliver content to medical students, as if they were creating 'products' or 'goods' to be delivered. Frequently, medical education is presented in a 'one-size-fits-all' approach using lectures and rigid clinical rotation schedules. Typically, medical education outcomes are focused on quantitative values such as licensing test scores and match rates into residency, without attention to the critical competencies of a physician such as interpersonal and communication skills, professionalism, reflective practice and shared decision-making. This training model is in direct opposition to the collaborative partnerships in which we expect trainees to engage upon their elevation to independent practitioners. The learner is somewhat like the patient—unable to 'delegate' their learning.

Recently, Englander *et al*. detailed how the coproduction model can be applied to health professions education [16]. Coproduction in education recognizes the content expertise of the teachers and the complex experiences and context expertise that students bring to their learning. This student–teacher partnership is also influenced by the context of the community and society in which it exists. Empowering students to coproduce their learning can help them form skills that they can carry into their career where they will be self-directed learners who chart their own paths. Coproduction of education is founded on collaboration and requires adaptability to new demands, flexibility in the face of practical constraints, and inclusivity of all perspectives. These tools are particularly beneficial in the uncertain times in which we find ourselves.

Coproduction in professional education is structured around the interactions among students, faculty, educational institutions and their communities. Students and faculty meet to set goals, design curriculum and develop assessments. Students bring their interests, self-recognized needs and a mindset of personal growth. Faculty bring medical knowledge, professional experience and expectations, and teaching flexibility to meet the needs of each student. The community partners in the development of curriculum that will allow students to gain competencies in the context of their lived experience. This is a cyclical and ever-improving model that encourages high-value learning for students. This high-value learning will eventually lead to the graduation of physicians who coproduce high-value health care.

Embracing the concept of coproduction during a pandemic ensures that education is adaptable, flexible and inclusive of all voices even in the face of many unknowns. The pandemic provided both time and space for adaptive changes to our complex medical education system to be discovered and enacted. Coproduction empowers every bright mind to address the complex challenges our society currently faces, even beyond the clinical environment. In addition, this explicitly collaborative model of education can help students build resilience against apathy during the period of reduced direct clinical involvement. In terms of specific education outcomes at our institution, coproduction has invited multiple faculty, student and system-driven curriculum changes.

University of Minnesota Medical School and coproducing education: implementation and predictors of success

The University of Minnesota Medical School is an academic medical centre accredited by the Liaison Committee on Medical Education. It uses the most common structure of medical training in the USA, comprising 2 years of pre-clinical studies (e.g. anatomy, microbiology and organ-system-based courses) followed by 2 years of clinical training. Core clinical rotations include family medicine, internal medicine, paediatrics, surgery, obstetrics–gynaecology, psychiatry, neurology and emergency medicine. Students are required to pass three National Board of Medical Examiners (NBME) tests during training to achieve a Doctor of Medicine degree.

Prior to the pandemic, the University of Minnesota Medical School was working towards an education model of coproduction among students, faculty and staff. In 2018 our institution engaged in a 5-year Undergraduate Medical Education Strategic Plan towards the following vision: 'A community, learning together, to prepare exceptional physicians to improve the health and well-being of Minnesota and beyond'. Two guiding principles of our strategic plan that support educational coproduction at our institution are to 'Empower

Students' and 'Standardize the outcomes, Individualize the Learning Pathways'. Our goal with empowering students is that in 2024 students will actively educate others, vote in all decision-making committees, co-design new curriculum programmes and engage in peer assessment. For individualized pathways, by 2024 the expectation is that each student will choose the context of their learning based on their needs to meet standardized competency outcomes. These ideals were borne out of a history of coproduction at the university, but without an established overarching framework.

Since the introduction of those goals, students are now voting members on admissions, curricular, assessment and advancement committees. Students are present in all working groups and task forces related to education and work with course directors to shape courses. In the clerkship years we created six novel longitudinal integrated clerkship (LIC) options for students who are interested in training in specific healthcare settings in the Twin Cities (Veterans Affairs Hospital, urban county medical centre, Level 1 trauma centres and rural community practices) and desire developing long-term relationships with both faculty preceptors and patients during the third year of medical school. These individualized learning pathways emphasize not only student and patient relationship building, but also collaboration between teacher and learner in hospitals and clinics over a longer than typical time period for traditional clerkships. Given our university's strategic plan focusing on student empowerment and individualized learning pathways, and our strong history of student and faculty collaboration, we believe our community was well prepared to coproduce educational reform during the COVID-19 pandemic.

Methods of communication in a coproducing world during COVID-19

To develop a collaborative response to COVID-19, our educational community had to rapidly develop a system to partner in sharing ideas. While early communication was laid out via email, we quickly realized the importance of 'face-to-face' communication during this time and went beyond mass emails to personally address student concerns. At the macrosystem level, the dean held weekly forums for students, staff and faculty with a panel of experts in education, research, clinical care, human resources and COVID-19. Additionally, a command centre was established with representatives from the primary health system (including 12 hospitals and their respective clinics) that included representatives from a 'huddle' each morning of learning environment leaders to make sure educational issues got addressed in an immediate fashion. We also had weekly academic health centre-wide Zoom meetings including key administrators in other health profession education schools. Finally, weekly huddles were held by the educational leaders of all of our key affiliate sites to help in vetting Guiding Principles for student re-entry into the learning environment among other things and then to address those principles to ultimately ensure re-entry as soon as feasible.

At the mesosystem level, each medical school class had regular Forums and Zoom meetings with faculty and staff, during which time students offered their expertise about specific interruptions in their micro-learning environments. These virtual meetings were open invitations for all students in the class. We also recognized that there was a need to continue to build community among students, especially those transitioning to clinical clerkships during the pandemic. We offered students structured opportunities to participate in virtual meetings to meet their colleagues who they would be joining during their clerkship years. This strong scaffolding and organization allowed us to deliver coproduced education which extended beyond curricular changes at the micro-level student learning environment.

Applying coproduction in COVID-19: early outcomes

COVID-19 action panels

The administration leaned on the medical students' experience early in its response to COVID-19. Students were asked to 'assist UME in co-producing the changes that the current situation calls for and to help streamline our conversations and student communications'. On April 9 four COVID Action Panels (CAPs) were formed. The panels consisted of 10 students from each year. Students self-nominated and then 10 students were randomly chosen from each year (only six self-nominated from the Class of 2020 that was graduating 3 weeks later). The CAPs were designed to be broadly representative and equitable.

Each CAP meets with the Assistant Dean for Curriculum, the Directors of Integrated Education for the Foundational or Clinical Sciences, Student Affairs staff and leadership, and other administrative staff, such as the Registrar, at a frequency determined by the students' and administrations' concerns and action items. The two CAPs for students in the clinical curriculum meet weekly given the rapidly changing landscape. Students cocreate curriculum changes with administrators and offer input on the effect of those changes on registration, financial aid and scheduling from the student perspective. This input is directly funnelled to the Associate Dean of Undergraduate Medical Education, the Dean of the Medical School and the Education Council (the school's governing educational oversight committee). Students on the CAPs make recommendations in a democratic fashion to influence school policy. For example, the students voted to recommend removing all previously scheduled rotations through October 2020. The students felt it was not possible to return to previously planned rotation schedules in an equitable way. Some students would be arbitrarily disadvantaged by a schedule built before COVID-19. This action was incorporated into UME planning by the Education Council shortly thereafter.

Another example of the influence of the COVID-19 Action Panel was their input in the decision to go virtual for the entire summer session for the new third-year class. This decision was influenced by both the Class of 2022 (the affected class) and the Class of 2021 (the current fourth-year class). The fourth-year class had the benefit of having completed most of their core clerkship year before the pandemic and having experienced at least one clerkship that included the structured (virtual) curriculum. Some students were upset at this decision because it altered their carefully designed schedules. The leadership and peer-to-peer support of the COVID-19 Action Panels were critical in ultimately obtaining consensus and buy-in from the majority of students. Students ultimately felt that they could trust the input of other students, which helped ensure that these changes could be implemented in a rapid fashion.

MNCOVIDsitters

Students at the University of Minnesota Medical School have a track record of engaging in service learning. According to the 2019 AAMC GQ survey, 60% of students were involved with a community-based research project compared to 33% nationally. Students turned their attention to community service in the days following their removal from clinical duties. One community need identified by students was the lack of childcare for healthcare employees. Those working in hospitals and clinics were suddenly without childcare after the governor ordered schools and day cares to be closed. Students organized MNCOVIDsitters (https://www.mncovidsitters.org), a volunteer organization to deploy medical students as care providers for the children of healthcare workers. This programme became popular in the local community and was widely covered in the national

press. As a result, satellite branches of the organization were created at medical schools across the country.

After the students had developed the organization, they approached the medical school with an expressed interest for academic support. The students saw the administration's willingness to build new courses with students in response to COVID-19. The students identified their passion for community service, interest in computer programming, and skills in design and media relations as valuable learning experiences for future clinicians. They were empowered to propose a credit-bearing course that recognized those experiences, which would make the entire organization a win–win from a community and educational perspective. The administration worked with students using its expertise in designing a course that would ensure a meaningful experience with well-defined objectives and assessments. Ultimately, students were able to uniquely create two courses that reflected both leadership development and community service experiences: COVID-19 Innovation Lab and COVID-19 Service Learning Elective.

Revisiting coproduction: one year later

It has now been a year since COVID-19 pandemic has impacted our world and local school community. We are now making concrete changes to our curriculum and overall medical school environment as a result of reviewing outcomes from the pandemic's impact on clerkships in the 2019–2020 academic year. New changes that resulted from embracing coproduction: (i) truly learning how to tailor medical education to fit students' needs and (ii) re-evaluating unnecessary educational components based on both faculty and student feedback.

It was determined that neurology curricular content portion of the clerkship could be condensed to 2 weeks. Students who are interested in neurology for career discernment could choose a neurology apprenticeship elective for an additional 2 weeks. Our surgical clerkship model also embraced a similar change, while providing even further ways for students to specialize and personalize their surgical education. The original rotation of 8-week duration was cut down to 4 weeks, followed by a new option to participate in a subspecialty of surgery elective. These new electives included a general surgery specialty (trauma/burn/critical care, general, transplantation and gastrointestinal/abdominal) and surgical subspecialty (neurosurgery, orthopaedics, cardiothoracic, vascular, otolaryngology, etc.). These changes were made after consultation with medical education faculty ideas and clerkship directors and with student input. A critical component to these new changes includes constant reflection and review of outcomes, which are conducted with email survey distribution to students and involved faculty/staff. Recorded videos from our Dean of Curriculum explaining the changes have also helped promote an interactive, coproduced and personalized feel to our medical school community.

Other changes that resulted during the pandemic included a brief stint in pass/fail clerkship grading and eliminating some clerkship final examinations, termed 'shelf' exams, offered by the NBME. We believe these changes produced a positive learning environment for students to focus solely on acquiring medical knowledge and becoming skilled in patient care principles, and as a result we have now switched to a pass/fail system for all core clerkship rotations.

We observed that our LIC model of education in the COVID-19 pandemic was extremely adaptable and amenable to coproduction changes. As a result, we founded a new LIC clerkship for students to open up additional spaces for students who wanted to become part of this novel learning environment. The LIC was a 'hybrid' of the traditional clerkship format (changing rotation locations and medical teams every 1–2 months and the longitudinal single site placement for the entire year), where students now rotate at Hennepin County Medical Center, as in our HELiX programme, but rotate through different teams and designated specialty services throughout 12 months. These important changes to clerkships will allow for an even more flexible and adaptable future of continual review, reflection, and coproduction at our medical school. We encourage other institutions to consider the coproduction framework and adopt similar changes in the future (Figure 1).

Lessons learned and future challenges

In the popular media there has been much discussion about pandemic fatigue. Overtime, people have become less committed to the ideas of physical distancing and good hygiene. We have observed a similar but anticipated phenomenon with student involvement in co-produced programmes such as the COVID Action Panel and MNCOVIDsitters. As the pandemic continued, students have gained more regularity in their routines and their expectations of the future are clearer. As a result, we have observed a decrease in coproduction participation because students are focusing on other professional activities. However, we are heartened by the fact that despite lower involvement, there continues to be dedicated students who are participating in the design of their educational experience half a year later. We believe the participation we see now is reflective of a baseline participation rate among students to be involved in education coproduction. We are seeing that as the acuity of challenges changes, both the amount of participation we can expect and the amount needed will change as well. However, we can rely on coproduction in future times for acute needs because of our previous experience at the start of the COVID pandemic.

Coproducing in pandemic recovery: moving forward

Schools around the country are in a continuous improvement mode as they adapt to educating in the time of COVID-19. There is a great deal of uncertainty about the future as information rapidly changes. In times of uncertainty, some institutions may choose to become autocratic in their decision-making. It has the advantages of being simpler to organize and quicker to enact, but may be disadvantaged by being narrow minded and short sighted. Our experience to date suggests that a coproduction model for medical education and healthcare delivery offers fresh insights and energy for leading the way forward. Coproduction empowers many different perspectives to address complex situations without obvious solutions. Coproduction has helped the University of Minnesota Medical School to address some of the first challenges from COVID-19 in ways better than we could have hoped, but there are new challenges on the horizon. For example, how can incoming first-year students become part of our community in a virtual learning environment? How will students obtain the experiences necessary to become strong applicants for residency programmes this cycle? How will they develop the skills necessary to eventually be successful physicians? Solutions to these questions can be brainstormed and developed using a coproduction model, so long as there is a mutual level of trust and community among students and faculty. Only through true partnerships between

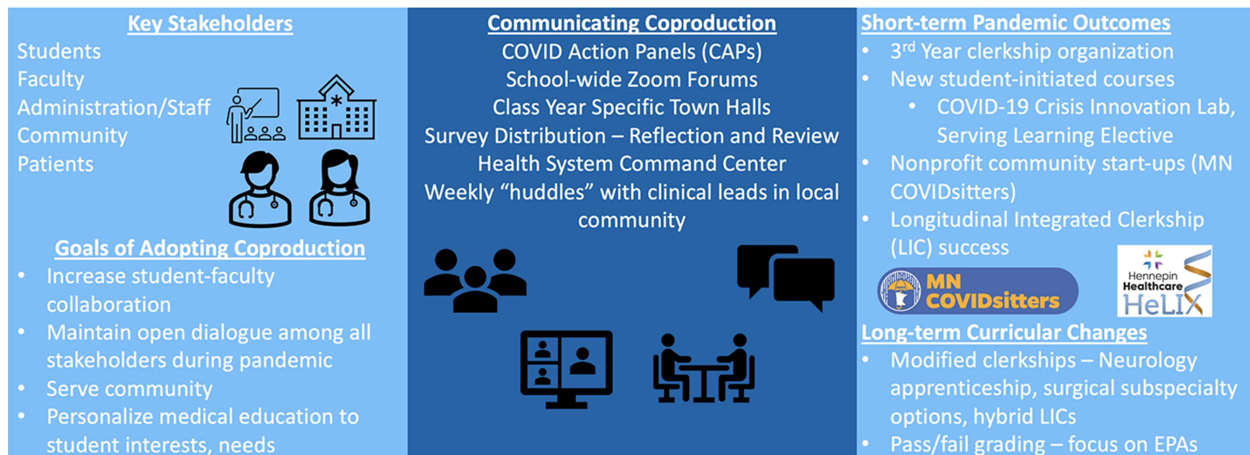

Figure 1 Coproduction in medical education during the COVID-19 pandemic: critical components of successful curricular reform.

students, their preceptors, and the systems and communities in which they exist can we together make opportunities from the challenges we face.

Conclusion

For the medical students training during the COVID-19 pandemic, the educational and healthcare responses of which they are a part will affect the ways in which they think about change, caring and learning. If students are coproducers in the response to this pandemic, they will learn to be leaders in times of hardship and be well-prepared to lead others in future crises. If they are marginalized and passive participants in the process, they will struggle to learn and to engage patients in a coproduction model as they transition from student to resident and ultimately to practitioner. We must continue to move towards inclusive, collaborative production of education for the benefit of students now and the larger medical community in the future.

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Ethics

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