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# Accelerating Change: Reshaping Tufts' Prelicensure Pain Curriculum to Meet the COVID-19 Challenge

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## Introduction

Tolstoy's dictum that "Happy families are all alike; every unhappy family is unhappy in its own way" [1] is relevant to descriptions of the state, national and global responses by medical educators to the coronavirus disease 2019 (COVID-19) pandemic. Each affected institution brought to the table its own history, culture, circumstances, and participants as it strove to overcome an unprecedented educational challenge. The COVID-19 pandemic pressure-tested educational philosophies and processes, revealing different strengths and vulnerabilities of each institution. This brief report describes our experience as pain management educators at Tufts University School of Medicine (TUSM) in response to sudden initial COVID-19 educational needs and curriculum changes over the subsequent 2020/2021 academic year.

The context in which we mobilized our pain educational resources at TUSM is distinctive, but has broader applicability for educators looking to expand pain curricula. Beginning in 2014, we began to collaborate with fourth year medical students enrolled in an annual elective on pain education, which we discuss in greater detail below. Concurrent statewide efforts to strengthen the prelicensure pain curriculum had been mobilized by our Massachusetts' governor in light of the worsening epidemic of prescription opioid misuse and opioid use disorder. Ten competencies related to opioids and pain were developed by the deans and their faculty representatives of our state's four medical schools [2] and adopted by each school during the 2015/2016 academic year [3]. Unrelated to specific concerns about opioid misuse, planning for a major curricular revision began at Tufts in 2017 with a sweeping set of reforms in pre-licensure medical education including new time and prominence for education in pain and pain management that were implemented beginning in the academic year 2019–2020. As a result, prior to the COVID-19 pandemic two novel elements had already been added to the Tufts curriculum. The first of these was mandatory pain medicine content structured into the first and second year curriculum. The second was our established fourth year elective for medical students interested in pain education, which included two components: student-faculty collaboration to create materials to expand pain education at Tufts and faculty-led comprehensive education on pain management. In fact, teaching cases developed with fourth year students during the 2018 pain education elective were significant resources in the new preclinical curriculum. Thus, when the COVID-19 pandemic emerged in early 2020, we were fortunate to have multiple curricular materials in readiness, along with an urgent need to prepare, organize, and integrate newly developed material, much of it interactive, using remote platforms. The above interactions are illustrated in Figure 1.

## Mobilizing Our Response

Facing an unprecedented pandemic in the spring of 2020, third- and fourth-year TUSM medical students were pulled from their clinical rotations; to accommodate fourth-year (M'20) students about to start final medical school rotations, our deans called for faculty to

## Lessons Learned

The pandemic's impact on our pain education curriculum (fourth year elective and preclinical curriculum) highlights numerous durable lessons learned:

- Identify opportunities: Anticipate and utilize drivers of innovation (e.g., statewide initiatives, internal scholarship, faculty availability and knowledge, patient and student engagement).
- Use what you have and make it stretch: Repurpose and apply existing pain education materials through an interprofessional and multidisciplinary process
- Implement active learning and engagement strategies (flipped classroom, case-based teaching, narrative medicine techniques, patient interviews).
- Mind the dose: Selectively use video conferencing and reflective tools to engage students.
- Find your partners, interprofessional if possible.
- Integrate the patient's voice and story into virtual learning.
- Adapt in the moment: include student input and collaboration regularly throughout the education initiatives to ensure appropriate curricular modifications, upgrades, and development.

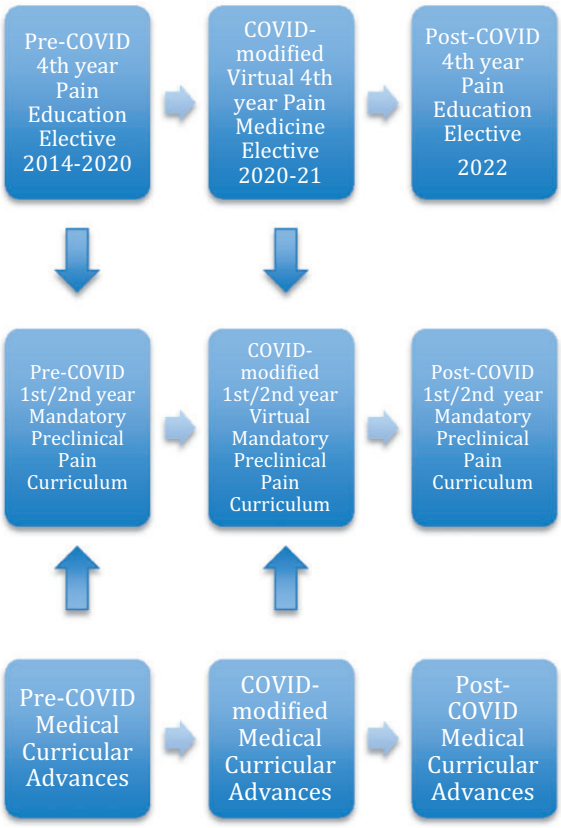


**Figure 1.** Flow diagram of the development of Tufts Pain Education pre, intra, and post-COVID.

immediately prepare and propose virtual electives. Recognizing the importance of pain education for future physicians and forced by the pandemic to implement alternate curricular opportunities, our team of pain educators met to propose a pain medicine elective.

Our pre-pandemic 4-week pain education elective for fourth-year medical students provided a foundation for our newly created month-long virtual elective. An overview of the first portion of this multi-year initiative was published in the journal *Pain Medicine* [4, 5]. Pre-existing, that is, pre-COVID-19, pain elective goals were to: 1) expose participating students to pain management practice and procedures (2 days/week observing in a pain treatment center); 2) provide a didactic and discussion forum for foundational pain topics; and 3) collaborate on developing pain education and teaching resources for the TUSM curriculum. Other than deemphasizing the third goal of this elective (see below) the goals were not changed during COVID-19. Achieving them, however, required transforming direct patient contact and procedural observation into a virtual format due to COVID-19-related restrictions on social contact. An updated description of our pain education initiatives, with additional remarks concerning our response to the pandemic, was presented in November 2020 as the lead-off lecture of a series hosted by the International Association for the Study of Pain (IASP) Pain Research Forum Pain Education Special Interest Group [6]. Building on our existing pre-COVID-19, in-person pain education elective, we offered a 4-week COVID-19-modified fourth-year virtual pain medicine elective. The pre-COVID-19 title of this elective, "Pain Education," was changed to "Pain Medicine" to reflect our shift in focus during COVID-19 on virtual clinical practice. While students continued to review and refine some pain educational materials during the virtual elective, this component was deemphasized, given our previous progress and changed attention during the pandemic teaching. In this brief report we describe the process of launching the virtual pain medicine elective, its curricular components, student feedback, and lessons learned for future educational endeavors.

## Building the Bridge as We Drove over It

In spring 2020, with all clinical education suspended, observation in pain management centers was no longer possible and so the focus became to develop—within a few days' time—an immersive online educational experience for fourth-year medical students (M'20) suddenly

requiring nonclinical rotations as the pandemic progressed. We (YSB, DBC) quickly adapted interprofessional pain education materials, pre-recorded lectures, and processes already in place at TUSM from its interprofessional Pain Research, Education and Policy Master of Science Program (1999–2020) and assembled them in a flipped classroom framework for this virtual elective course. Given the opportunity for interprofessional engagement in the pandemic setting, our TUSM pain education team expanded to include a pain medicine physician/anesthesiologist (AMB) and a pain education nurse experienced in narrative medicine (PKR). We had providently been expanding our existing set of pain education teaching cases with a fourth-year Tufts MD/MPH student (see Acknowledgements) who had identified the need for additional pain education resources.

In organizing this pandemic virtual elective, we used our existing and new cases to provide a systematic pedagogical approach for engagement and active learning in pain education. In addition, we emphasized narrative medicine and asynchronous virtual reflective exercises to allow students to explore the patient experience (albeit virtually); to follow their own interests and learning needs in pain and pain management; and to share their own discoveries including further resources they identified. Rollout of the above strategy required us to be nimble in gauging the students' needs and promptly assembling materials suitable for their exploration and growth. The small (N = 6) group environment afforded us the flexibility for creativity, improvisation and experimentation. On the other hand, we were often only able to stay a few days ahead of the students' learning curve. Given the opportunity to display the idealism and altruism that led them to seek a medical career, students were highly engaged in acquiring skills and knowledge about pain in their final month's rotation before graduating medical school. Looming behind this purposefulness were understandable concerns that their academic preparation might prove inadequate as they entered internship, and that they themselves were at risk of developing COVID-19.

We had a 1-month break in our schedule that permitted additional reflection upon and recovery from the intensity of this small group-teaching model before being asked to offer it again, this time as the first rotation for six of the newest batch of fourth year students (M'21). Repeating the elective while it was still "fresh" allowed us to further develop and refine it. At the same time, we were all becoming more accustomed to living and teaching in the pandemic world.

| Didactics | Student-driven learning | Didactics | Didactics | Student-driven learning |
|---|---|---|---|---|
| M 5/4<br>10-12: The pain system and pain terminology<br>1:30-3:30: Case Discussion #1 - Chronic Pain | Tu /<br>Set Personal Objectives on VoiceThread<br>Write up a patient with pain/ post to Voice Thread | W 5/6<br>10-12: Analgesic pharmacology (Opioids 1)<br>1:30-3:30: Case Discussion #2 - Acute Post-op Pain | Th 5/7<br>10-12: Analgesics (NSAIDs & Adjuvants)<br>1:30-3:30: Case Discussion #3 – Multimodal pain | F /<br>Self-study of elective and personal learning objectives<br>Post to VoiceThread |
| M 5/11<br>10-12: Pain Education// Opioids 2.0<br>1:30-3:30: Case Discussion #4 – Trauma case | Tu /<br>Self-study to meet learning objectives<br>2 groups – Case Discussion #5 – Headache | W 5/13<br>10-12: Neuropathic pain<br>1:30-3:30: Case Discussion #6 – Neuropathic pain | Th 5/14<br>10-12: Back pain<br>1:30-3:30: Case Discussion #7 – Back Pain Case | F /<br>Self-study of elective and personal learning objectives<br>Post to VoiceThread |
| M 5/18<br>10-12: Cancer-related pain<br>1:30-3:30: Case Discussion #8 – Cancer Pain case | Tu /<br>Self-study to meet learning objectives<br>2 groups – Case Discussion #9 – Pain with Cancer | W 5/20<br>10-12: Pelvic Pain<br>1:30-3:30: Case Discussion #10- Pelvic Pain case | Th 5/21<br>10-12: Myofascial Pain<br>1:30-3:30: Case Discussion #11 Perioperative pain and OUD case | F /<br>Self-study of elective and personal learning objectives<br>Post to VoiceThread |
| M 5/25<br>***Memorial Day*** | Tu /<br>Self-study to meet learning objectives<br>Videos, readings, resources<br>Project development | W 5/27<br>10-12: Student-led presentations/discussions<br>1:30-3:30: Case Discussion #12 - Opioid Taper Case | Th 5/28<br>10-12: Student-led presentations/discussions<br>1:30-3:30: Student-led presentations/discussions | F / |

**Figure 2.** Tufts fourth year medical student virtual pain education elective schedule calendar during COVID-19.

## Schedule, Content, and Framework

Figure 2 depicts the broad organization of the case-based learning and other didactic and learning experiences as they were presented to M'21 students in their month-long pain education elective. Each week included three days of didactics (M, W, Th) and two days for self-directed learning (T, F); 2-hour morning sessions on didactic days were devoted to discussion of the highlights of prerecorded lectures and readings. The afternoon sessions were an exploration of a case. Integral to the course content was the identification, development and refinement of a group of teaching cases. These included cases developed in earlier years of Tufts' pain education elective, the new cases created by an M'20 student as described above, an educationally oriented text [7], and cases available through National Institutes of Health's (NIH) Centers of Excellence in Pain Education [8].

The case topics included:

1. Chronic widespread pain (fibromyalgia)
2. Acute pain (postoperative thoracotomy pain; opioids, local anesthetics, adjuvants)
3. Multimodal pain management (chronic pain; NSAIDs plus adjuvants)
4. Post-traumatic pain with amputation during methadone maintenance
5. Headache
6. Neuropathic pain
7. Back pain
8. Cancer pain #1 (back pain, history of mastectomy)
9. Cancer pain #2 (prostate cancer with bone metastases)
10. Pelvic pain
11. Abdominal pain
12. Perioperative pain and opioid use disorder
13. Chronic pain with opioid taper

## Rolling out Reflective Learning

A challenge in online teaching is the need to provide a reflective and collaborative space for students to synthesize and incorporate learning into their own experiences [9]. In the traditional classroom, face-to-face learning allows for a natural sharing of experiences and informal reflective processes with classmates. In addition to case-based learning and traditional lecture formats, we sought a way to replicate the benefits of usual classroom dynamics through an interactive digital platform some of the faculty had previously used.

Although other interactive platforms were possible, our choice was VoiceThread as it allows for text, audio, or video posts as well as commenting and discussion between students [10]. We introduced VoiceThread to students at the beginning of the course and asked them to post their individual goals and objectives for course learning after the initial class, which allowed the faculty to target specific areas of interest for customizing curricular objectives. Students were also asked to post (audio, video, and/or text) their three key learning takeaways from the didactic portion of the course each week, along with three items related to the curriculum that they would like to further explore. What ensued was a rich online forum for sharing and dialogue between students and, occasionally, faculty. Students commented on others' observations and reflections and generously shared additional resources that they found independently to dive deeper into specific topic areas. Video links for items such as topical TED Talks, narrative medicine selections, and patient-focused videos on the pain experience were shared easily on the VoiceThread platform, inviting discussion and commenting. As faculty, we observed that this multidimensional process brought a deeper level of understanding of both the patient experience of chronic pain as well as the societal burden of pain [11].

## Student Feedback

Student evaluations of the fourth-year pain education course described specifics about what students valued or what could be improved upon in the structure and content of this elective (see Table 1). Overall, the student comments identified four key aspects of the elective: value of an interprofessional faculty; broad scope of dialogue (student-to-student and student-to-faculty); exposure to a range of pain conditions and interventions; and introduction to reflective practice and narrative medicine. Excerpts of student narrative evaluations are presented in Table 1.

Students felt the elective made them more confident in their approach to assessing pain and to developing a pain management plan. At the same time, they expanded their understanding of the complexity of pain and its management along with better understanding of the socioemotional skills needed to support patients with pain. Students highlighted their appreciation for the narrative medicine emphasis, patient experience framework and reflective nature interwoven into the structure and breadth of the elective. While it is well-known that students who elect additional education in pain medicine are likely to be more enthusiastic, we found the specifics of their feedback illuminating regarding their developmental needs. Although students' motivations for enrolling in this elective initially focused on pain content, over time they found the exploratory and reflective nature of the elective to be well-suited at this point in their development as physicians in training. The reflective structure and opportunity for self-directed learning allowed students to revisit their prior clinical experiences with patients whose needs for pain management were inadequately met, while advancing and integrating their knowledge and skills to better meet future patient needs.

## Preclinical Curriculum: Lessons from the Pandemic

Pain education has been unevenly integrated into the basic science, preclinical curriculum of most medical schools [12]. Our efforts to enhance longitudinal pain education at TUSM targeted not just the final year of

**Table 1.** Tufts fourth year medical student narrative feedback and selected student evaluations on the virtual pain education elective during COVID-19

| What were the strengths of this course? | Please add any other comments: | What material about pain would you prioritize to include and/or expand in the clinical curriculum? |
|---|---|---|
| The enthusiasm of each facilitator. There was no weak link: each of you brought real, clinical, AND personal life experience to the course and discussed those important topics with real passion. | So much of this experience was driven by the expertise and enthusiasm of the faculty; I would keep that in mind when adapting the material to the new curriculum. | I would prioritize the basics (which classes are specific for which types of pain) and the narrative aspects. |
| Body of knowledge and approachability of professors, extremely relevant topic, cases and discussion. | Thank you all!! | Intersections of pain and substance abuse. |
| Many expert and diverse voices highlighted (nursing, basic science, clinical (anesthesia and primary care), psychology, advocacy, pain narratives), iterative customization to student interests, well-facilitated discussions for inclusive involvement of all students, high-quality video content (esp. liked the opioid/non-opioid treatment lectures during week 1, pelvic/myofascial pain lectures), very supportive learning environment, interactive sessions for tai chi and body scan, Dr. Barreveld's high-quality cases studies from the collaborative pain education grant [CoEPE] | This really will be a highlight of my clinical education—I feel like I really have the tools to treat pain, connect with people who experience chronic pain, and the vocabulary to advocate on their behalf. This topic was done justice through such an interdisciplinary instructional team and curriculum. Flipped classroom was done very well with high quality videos and case materials. Voice thread and zoom discussion allowed for rich exploration of topics specific to student interests. Would recommend to all Tufts students!! | Narrative medicine as a way of reflecting on own clinical experiences, opioids (mechanism of action, benefits, risks profile beyond potential for misuse), acute pain management for those with OUD or chronic pain, basics of nociplastic pain (which I had never heard of before this course!!)—mechanism[s] and what treatments help |
| The kindness and eagerness to teach of the faculty, course design, topics chosen, built in flexibility for discussion, openness to questions, supplementary materials posted. | This is one of the best courses, if not the best, I've ever taken. The faculty is a dream team of experts. Not only that, they are amazing people to work with. I have never been as enthusiastic or curious as I was during this course. I was excited to participate every day, and I was sad to have it end. My classmates in this course were exceptional. | This course should be required in medical school curricula |
| 1. Having all of the faculty in the sessions felt like an incredible gift. I realize how much time and effort went into developing and running this course, and I think all the students really appreciated the opportunity to learn from them directly throughout the course. I also valued the unique knowledge and expertise that each faculty contributed to our discussions and felt that they perfectly complemented each other. They created a very safe and comfortable environment for students to learn and share our own personal or clinical experiences. 2. I loved that pharmacology, clinical reasoning, public health and research were intermingled in each of our sessions/topics. 3. The flexibility and genuine interest in student's backgrounds, knowledge and experiences. I think part of what made this course such a wonderful experience for me (and I sense for some of my classmates as well) is that I felt that my perspective was always received with curiosity and valued by the group. | I'm so grateful that I was able to join this class at this particular time, allowing me to process and reflect on both the unique circumstances of COVID and the end of our Core clerkship year. Thank you! | I think discussing myofascial pain, pelvic pain and neuropathic pain in the clinical curriculum would be extremely helpful. I also think it should include reflection and discussion on the experience of pain (framed with patient stories, patient presentations, poems and other art forms). I think even just learning about the different elements of pain (sociopsychobiological) and types of pain can open the door to meaningful discussions about empathy, health justice/advocacy and cultural diversity. |
| Open discussion time, student engagement on Voicethread, but most importantly the open and safe atmosphere to ask any question and discuss any topic<br>I think this course works very well on Zoom. | I would like more students to have the opportunity to take this course, but at the same time I thought that my group was small enough that we all felt very comfortable talking and sharing our thoughts and experiences. I'm not sure how the balance between these two factors can be reached, but I definitely felt that this elective covered material is essential for any medical student, regardless of their field of interest. | I assume we are talking about the general medical curriculum and not about this class specifically: I would emphasize pain options (opioids, NSAIDs, non-pharmacologic modalities, etc.) because before going into this class I simply had no idea what was available. I would also talk about how to use opioids effectively because of the fear around prescribing them. |

medical school during elective learning for a small number of students, but also involved the required curriculum for the 200 students in each of the first- and second-year cohorts. This Tufts "new curriculum" has four broad longitudinal threads presented during a half-day per week throughout the entire curriculum: 1) Population Health, 2) Professional and Personal Development, 3) the Health Care System, and 4) Patient Experience. This Threads portion of the Tufts curriculum begins with an introductory three week course entitled "Population Health and the Profession of Medicine." Pain medicine falls within the Patient Experience thread. Pre-pandemic, we had developed a five-part pain education series to be integrated into the Tufts first- and second-year school-wide curricular initiative implemented beginning in the 2019–20 academic year (two cases in the first year and three cases in the second year). This series included a one hour introductory pain medicine lecture the week prior to the first of the 2-hour detailed case study sessions. Self-managed small groups of 10 students worked through the case and reconvened for a 50-minute multidisciplinary faculty panel that discussed the case and underlying condition from the perspectives of different pertinent specialties. The two first-year cases included the topics of "Chronic Low Back Pain" in the Musculoskeletal Course and "Chronic Abdominal Pain" in the Gastrointestinal Course. We had already implemented both of these sessions for first-year (M'23) medical students when the pandemic struck.

Our ongoing efforts to advance the second-year curriculum (M'23 students) in the fall of 2020 during the pandemic were informed by our experience in reshaping the fourth-year pain elective during the spring of 2020, particularly the lessons learned from teaching virtually. Although the goals and objectives of the preclinical pain curriculum were not altered by the COVID-19 pandemic, the means to achieve them required adaptation. One recurring challenge has been to avoid placing an excessive cognitive load upon students during mandatory live Zoom teaching. Our second-year topics were "Headache and Post-Stroke Central Pain" in our Brain (Neuroscience) Course; "Pelvic Pain" in our Reproductive Medicine Course, and "Cancer Pain" in our Hematology-Oncology Course. As the semester continued, students strongly advocated to limit each mandatory Zoom session to two hours out of respect for students' potential fatigue. Faculty panels after the cases were originally intended to encourage spontaneous student feedback and participation; given the constraints of the Zoom format, we realized we could not achieve that sustained level of engagement. Therefore, we shortened the faculty panels to 30 minutes and the cases to 1–1.5 hours. Responding to the students' COVID-19-induced stress, occasional passivity and apathy, and virtual learning-induced isolation, we recruited a live patient to interact via Zoom preceding the case study sessions, imbuing the latter with immediacy and authenticity. Students responded with enthusiasm to the articulate and generous patients we invited. Patient sessions were 30–50 minutes. We adapted the two first-year cases, "Chronic Low Back Pain" and "Abdominal Pain" in a similar manner during the academic year 2020–21 and added another 30-minute follow-up pain lecture.

## Conclusion—Lessons Learned

As of the preparation of this manuscript, the COVID-19 pandemic remains a major global public health issue, with new strains appearing on multiple continents. On the other hand, in the Boston area, the rate of new infections, hospital and intensive care unit (ICU) admissions, and deaths clearly are declining. We are still finding our way forwards but even now it is clear that the innovations in medical education suddenly adopted will not be abandoned soon. The increasing use of videoconferencing, prerecorded lectures, virtual learning and hybrid models was already evident prior to the pandemic. These trends undoubtedly represent a long-term shift in the fundamental approach to education in general. To the extent that they offer value amid a perpetually overpacked medical curriculum, and render the educational process more efficient, some innovations will persist during the post-pandemic "new normal." Others—particularly those associated with the risk of interindividual contact spread of the COVID-19 coronavirus, such as face-to-face history-taking and physical examinations—will revert toward pre-pandemic customs. But even then, the convenience and lowered expense of stockpiling particularly valuable discussion cases and lectures for asynchronous use will argue for their persistence in the medical curriculum. Reliance on high tech resources is often expected to shift educational experiences into depersonalized passive realms; in our experience this was not the case. The pandemic accelerated our reshaping of the curriculum, refocused its delivery and emphasized the importance of the patient narrative. Anticipated post-pandemic pain education challenges for preclinical teaching include reintegrating in-person teaching with curricular changes and assumptions evolved during the pandemic. Fourth year pain elective challenges include optimizing the balance of flipped classroom didactics and discussion, focused-probing of illustrative teaching cases, and exploration of the patient and clinician voice through narrative medicine while returning to clinical observations.

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