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# Novel application of telemedicine and an alternate EHR environment for virtual clinical education: A new model for primary care education during the SARS-CoV-2 pandemic

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ABSTRACT

*Background:* Restrictions to direct patient contact resulting from the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) pandemic left some medical students near graduation in need of a required critical care medicine (CCM) sub-internship. A group of educators deployed a virtual curriculum utilizing telemedicine and electronic health record (EHR) technologies.

*Methods:* Nine students participated in a formal curriculum of high-value critical care medicine topics designed to meet the learning objectives of the in-person experience. Students obtained patient histories and directed physical examinations virtually via telemedicine. They followed assigned patients, submitted clinical documentation, and practiced electronic order entry using a non-production EHR copy. At conclusion these students completed the same evaluation used for "in-person" CCM rotations earlier in the year.

*Results:* Students rated the virtual rotation comparably to the traditional rotation in most evaluated criteria. Lower rated areas included "perform minor procedures", "patient counseling", and "interprofessional experiences". Students' narrative responses specifically noted strengths of the "student focus" and the ability to practice in an EHR copy.

*Discussion:* Students and preceptors generally found that the virtual curriculum provided adequate educational opportunities. Certain areas were clearly lacking, as expected. Students felt the dedication of the faculty to the students' educational needs was the most important factor contributing to the success of the program. The results suggest several ways telemedicine and EHR technologies might enhance clinical medical education in the future.

*Conclusion:* This methodology was successful in providing elements of a CCM rotation experience. This technology could prove efficacious for primary care rotations where in-person training is not feasible due to the SARS-CoV-2 pandemic.

## 1. Introduction

On March 17, 2020 in response to the growing pandemic due to the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) and in compliance with the Association of American Medical Colleges directive, our health system and medical school temporarily restricted medical students from all health system facilities and direct face-to-face patient contact including primary care ambulatory and inpatient locations. The school immediately converted to a virtual didactic curriculum. Nine fourth year medical students had not yet completed required

*Abbreviations:* CCM, critical care medicine; EHR, electronic health record; PROD, production copy of the EHR; SARS-CoV-2, Severe Acute Respiratory Syndrome Coronavirus 2; SUP, supplemental EHR.

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sub-internship rotations in critical care medicine potentially jeopardizing their graduation in Spring 2020. In response to this challenge a small group of educators and clinicians quickly developed and implemented a 'virtual rotation' for these nine medical students that would satisfy learning objectives and meet expected educational outcomes of the traditional block.

A didactic curriculum provides medical knowledge around illness and treatment but lacks the patient interactions necessary for practicing medical skills such as gathering and documenting a history and physical examination, developing an appropriate differential and plan of care, order entry, oral case presentations, handoff communications, and the opportunity to follow patients' clinical courses. The quandary was to identify potential mechanisms by which we could provide students the opportunity to practice these skills while not physically present with the patient.

Telemedicine technology emerged as a likely candidate to bridge this educational gap. Telemedicine has grown rapidly over the past decade. An American Hospital Association survey reported that 76 % of hospitals had implemented some form of telehealth as of 2017 [1]. In response to the growing SARS-CoV-2 pandemic, the federal government eased regulations and financial barriers that had previously limited expansion of telemedicine resulting in a rapid acceleration of telemedicine use in patient care [2]. Within our health system the percentage of telemedicine encounters increased from 1 % immediately prior to the pandemic to 62 % of all encounters one month later (Fig. 1).

The incorporation of telemedicine into medical education has grown much more slowly. A mixed-methods review of the literature published in 2019 identified seventeen medical schools that implemented telemedicine training and exposure in the preclinical years and over sixty that provided some form of telemedicine training in the clinical years [3]. There are examples of telemedicine being utilized for specific educational goals in specialties with earlier telemedicine adoption, such as intensive care [4], dermatology [5], and primary care [6], as well as to promote interdisciplinary learning and professionalism [7,8]. Assessments of student skills using a telemedicine objective structured clinical exam is effective [9], accepted by students and economical to implement [10]. Others have suggested possible uses of telemedicine to support undergraduate and graduate medical education during the SARS-CoV-2 pandemic [11,12].

Another difficulty in remote clinical training of medical students is access to and use of the electronic health record (EHR). In consultation with our information technology, EHR security, patient privacy, and clinical colleagues, we decided that remote use of the production copy of the EHR (PROD) by those who did not provide direct patient care during this educational experience was not appropriate. Instead we explored the use of already existing alternate EHR environments. Health systems utilize multiple "copies" of PROD for testing, training, and analysis [9, 13]. One such environment, called supplemental (SUP), is a one-day-old exact copy of PROD generally used for analytics and testing using actual patient data. The new copy overwrites the prior version every 24 h. Students can view real patient data on a delayed basis. They can formulate their assessments, proposed plans, and enter notes for preceptor review without yet knowing the outcome, while the preceptors introduce them to the patients in real time. They can even enter orders in a pending status without impacting the patient or any downstream applications such as the laboratory or radiology since SUP does not interface with them. The preceptors can then review the students' entries. None of this activity impacts the production EHR or any of the patients' records, and the student's work is deleted every night when the SUP environment is overwritten.

## 2. Methods

Nine fourth year students (M4) needed to complete critical care medicine (CCM) to meet graduation requirements. We rapidly created and implemented a four-week virtual rotation in CCM to achieve the learning objectives of the Medical Curriculum Committee (MCC) approved CCM syllabus and our school program objectives. This rotation contained several distinct educational elements:

1 Didactic curriculum: Students on in-person CCM rotations attend didactics offered for student and resident trainees in that setting. We took the approach of customizing interactive didactics to the M4 student level presented in a developmentally appropriate order. Critical care fellows designed and taught lectures to students midday in a 4-week framework based on their high value in critical care: acute respiratory failure; mechanical ventilation; shock; and shock management. Students prepared each week using online podcasts and supplemental materials [14]. Midweek a CCM fellow on service presented a separate review session after rounds with questions and answers. Each didactic module was followed by an online quiz developed by our CCM faculty. A Friday journal club with the same focus allowed for knowledge reinforcement and application.

2 Virtual patient encounters: Critical Care Fellows and residents assigned to our intensive care units served as the faculty facilitators for the students' encounters with patients. CCM fellows carefully selected patients with a broad variety of typical critical care diagnoses and pathophysiological processes for the students to broaden the didactic discussions. The most appropriate were those patients who were able to interact for a history and physical exam with a student. The fellow obtained patient consent prior to the student session.

Considering the Covid pandemic, the distribution of patients available for teaching was skewed. All were adult patients. Ordinarily there

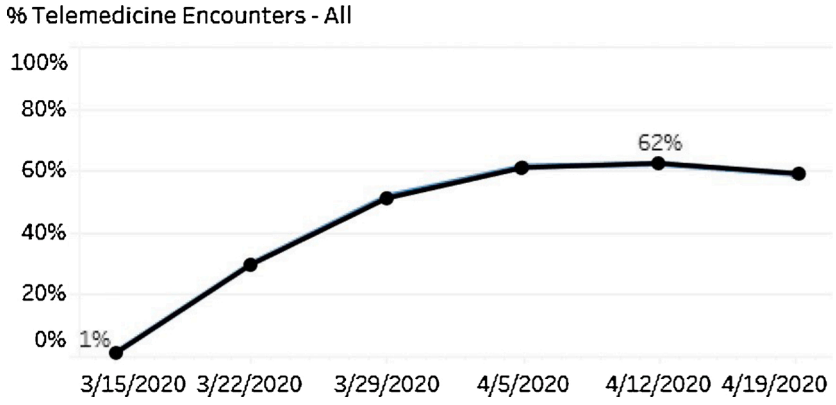


**Fig. 1.** Frequency of telehealth across all Geisinger Health System clinics early during the SARS-CoV-2 pandemic corresponding to the timeframe of the virtual CCM rotation.

would have been a preponderance of cardiac and cardiac surgical problems, but elective surgeries were limited. It was not practical to include patients with Covid due to the impediments of the personal protective equipment and need to limit exposure time for residents and fellows, and limitations on availability of the technical resources.

3 Technical solutions: We utilized two already implemented telehealth applications, Caregility's Univago HealthCare Edition iConsult™ (Eatontown, NJ) and Phillip's eCareManager™ (Amsterdam, Netherlands) to provide an audio and video interface compliant with the Health Insurance Portability and Accountability Act between the fellow and patient in the unit and remotely to the assigned sub-intern. The students easily loaded the necessary apps on their mobile devices and logged on with their assigned account for access. The fellow brought a connected tablet or telemedicine cart device into the patient's room.

Utilizing the telemedicine solution students were able to interview patients and obtain a clinical history remotely mid-afternoon when the fellow and student were both available, not during morning rounds. The students directed the fellow in conducting appropriate aspects of the physical examination, which the fellow relayed back to the student. The fellow was able to provide feedback to the students throughout the process by remaining on the telemedicine visit in real time.

These patient encounters provided authentic CCM patients for clinical teaching rounds during which students presented their new cases, shared follow-up on established patients, and practiced handoff communications. These activities fulfill several of the entrustable professional activities expected of the medical school graduate [15].

4 Student Documentation in EHR: Our health system utilizes Epic™ (Verona, WI) as our inpatient and ambulatory EHR. The students had access to the SUP environment for the duration of the virtual rotation, and utilized this environment to write patient notes, create a plan of care and place orders. The senior faculty for the rotation reviewed and critiqued the student's work each day prior to the middle of the night overwriting of the SUP environment. The following day the student would compare their plan of care to the actual plan of care instituted by the patient's care team in the hospital and reflect on the differences and similarities.

5 Assessment of students. Students had to achieve a minimum score of 70 % on each of 4 quizzes. Critical care fellows, residents, and faculty preceptors evaluated each student one-on-one using the same assessment tools as for in-person rotations.

6 Student Evaluation of Rotation: Upon completing the CCM rotation students provided an end-of-rotation evaluation with 46 mixed rating and narrative questions focused on the four broad categories of quality of teaching, patient experience and access, opportunity to actively participate as a sub-intern, and rotation outcomes. Student evaluation of the overall educational value of the rotation used a 5-point Likert scale (1 = poor, 2= fair, 3= good, 4=very good, 5 = excellent).

The evaluation form was an almost identical copy of the one provided to other medical students completing traditional clinical rotations (Table 1) which had been designed internally and previously approved by the MCC. This is a standard form used for years at the medical school, but not externally validated. The Liaison Committee for Medical Education (LCME) reviews these forms and ultimately retains approval authority of the MCC-approved curriculum. For clarification, several questions had the qualifier "virtual or traditional" included in the question to avoid confusion and promote consistency in question interpretation. For the virtual rotation evaluations, four additional questions sought the students' rating of the specific technology and solicited comments on the strengths and weaknesses of the technology. We strongly encouraged our students to complete the evaluations and

**Table 1**
Intensive Care Unit (ICU) Rotation Evaluation Questions.

| # | Question | Type |
|---|---|---|
| 1 | Were you observed *(virtual or tradition)* by the Preceptor(s)? | Yes/No |
| 2 | How would you rate the frequency of the Direct Observation by the Preceptor(s)? | Likert |
| 3 | Were you observed by *(virtual or traditional)* the Resident(s)? | Yes/No |
| 4 | How would you rate the frequency of the Direct Observation by the Resident(s)? | Likert |
| 5 | How would you rate the teaching quality by the Preceptor(s)? | Likert |
| 6 | How would you rate the teaching quality by the Resident(s)? | Likert |
| 7 | Were you provided direction and feedback by your Preceptor(s)? | Yes/No |
| 8 | How would you rate the direction & feedback by your Preceptor (s)? | Likert |
| 9 | Were you provided direction and feedback by your Resident(s)? | Yes/No |
| 10 | How would you rate the direction & feedback by your Resident (s)? | Likert |
| 11 | Is there anything else you would wish to share regarding the quality of teaching? | Narrative |
| 12 | How would you rate the variety of medical diagnoses? | Likert |
| 13 | How would you rate the volume of patients available to your medical team? | Likert |
| 14 | How would you rate the ability to meet logging requirements? | Likert |
| 15 | How would you rate the opportunity for interprofessional experiences? | Likert |
| 16 | Is there anything else you would like to share regarding the patient experience at your Sub-Intern site? | Narrative |
| 17 | How often were you responsible for obtaining history and physical exam on your patients? | Likert |
| 18 | How often were you responsible for rounding *(virtually or traditionally)* on your patients? | Likert |
| 19 | How often were you responsible for reporting *(virtually or traditionally)* to team/attending on your patients? | Likert |
| 20 | How often were you responsible for transitions *(virtually or traditionally)* of care for your patients? | Likert |
| 21 | How often were you responsible for counseling your patients and their families? | Likert |
| 22 | How often were you responsible for developing differential diagnoses for your patients? | Likert |
| 23 | How often were you responsible for interpretation of labs and diagnostic results on your patients? | Likert |
| 24 | How often were you responsible for suggesting a plan of care for your patients? | Likert |
| 25 | How often were you responsible for documentation (on student platform) in the medical record? | Likert |
| 26 | How often were you responsible for researching databases (Medline, Cochrane, UpToDate) to benefit patient care? | Likert |
| 27 | Is there anything else you would like to share regarding your opportunity to actively participate in the role of a "Sub-Intern"? | Narrative |
| 28 | The ICU Sub-Internship allowed you to attain further knowledge required to evaluate critically ill adult patients | Likert |
| 29 | The ICU Sub-Internship allowed you to attain further clinical skills required to evaluate critically ill adult patients | Likert |
| 30 | The ICU Sub-Internship allowed you to attain professional behaviors required to evaluate critically ill adult patients | Likert |
| 31 | The ICU Sub-Internship allowed you to become familiar with the functioning of the intensive care unit and working with a multidisciplinary team | Likert |
| 32 | The ICU Sub-Internship allowed you to learn 'multitasking' skills required to care for a larger number of patients with complex needs simultaneously | Likert |
| 33 | The ICU Sub-Internship allowed you to gain further knowledge of the diagnosis of illnesses encountered in critically ill adult patients | Likert |
| 34 | The ICU Sub-Internship allowed you to gain further knowledge of the management of illnesses encountered in critically ill adult patients | Likert |
| 35 | The ICU Sub-Internship allowed you to gain knowledge to recognize need for, and management of basic non-invasive and invasive ventilation | Likert |
| 36 | The ICU Sub-Internship allowed you to gain knowledge of interpretation and application of arterial blood gases | Likert |
| 37 | The ICU Sub-Internship allowed you to gain knowledge of prevention of complications associated with stays in the intensive care unit setting | Likert |
| 38 | | Likert |

(*continued on next page*)

**Table 1** (*continued*)

| # | Question | Type |
|---|---|---|
| | The ICU Sub-Internship allowed you to gain knowledge of application of palliative care medicine in the intensive care unit setting | |
| 39 | The ICU Sub-Internship allowed you to perform minor procedures common to the practice of a physician (i.e. Venipuncture, IV catheter, Foley catheter insertion, Nasogastric tube insertion, etc.) | Likert |
| 40 | Is there anything else you would like to share regarding the outcomes of the Sub-Internship? | Narrative |
| 41 | How would you rate the overall educational value of the ICU Sub-Internship experience? | Likert |
| 42 | Is there anything else you wish to share regarding the overall value of your ICU Sub-Intern experience? | Narrative |
| 43 | *The Epic-SUP access played an important role in my ICU clinical experience* | Likert |
| 44 | *The e-ICU experience played an important role in my ICU clinical experience* | Likert |
| 45 | *The [communication] app experience played an important role in my ICU clinical experience* | Likert |
| 46 | *Please comment on the strengths and weaknesses of these technologies in providing clinical access to patients and patient records* | Narrative |

Note 1: Italic text represents qualifiers and questions added to the standard evaluation for the virtual rotation.
Note 2: Likert scale allowed the students to rate on a scale from 1 to 5, with lower numbers representing a more negative impression and higher numbers a more positive impression.

provide ample narrative comments.

### 2.1. Human subjects protections

Student appraisals of their courses and rotations is required throughout medical school. The LCME has approved this requirement, and students are aware of and accountable for completion. Since these evaluations are not experimental, the Geisinger institutional review board deemed this activity does not meet the definition of research, and therefore did not require further review or approval (IRB #2020-0386).

## 3. Results

All nine medical students successfully completed the virtual CCM rotation; seven submitted evaluations available for this analysis and each answered all questions. These 4th-year students were a mixed group committed to various residency programs with the commonality of being scheduled for their CCM subinternship just as Covid restrictions were put in place. We compared these evaluation results with student evaluations of the traditional CCM rotations during the first half of the 2019–2020 academic year (n = 30) from all clinical campuses offering a CCM rotation. The virtual CCM rotation utilized only one hospital location to focus and utilize educational efforts during the pandemic most effectively. There were too few evaluations from the virtual curriculum, and only from one of the several campuses for any meaningful statistical comparisons with the results from the more varied in-person rotations.

The overall Likert average score was 3.5 for the in-person rotation and 4.1 for the virtual rotation (Fig. 2). Student scores of observation and direction by, as well as feedback from, preceptors and residents were slightly higher for the virtual rotation (Fig. 3).

A radar chart compares the student ratings of 32 rotation features in the four broad categories of quality of teaching, patient experience and access, opportunity to actively participate as a sub-intern, and rotation outcomes between the traditional in-person and virtual CCM experiences (Fig. 4). This visualization shows that the students' evaluations between the in-person and virtual rotations generally parallel each other. Areas that were rated relatively poorly by the students in the virtual compared to the in-person rotation were interprofessional experiences (3.8 in-person and 3.0 virtual), patient counseling (2.9 in-person and 1.3 virtual) and perform minor procedures (3.2 in-person and 2.5 virtual).

The student narrative responses (nearly 40) regarding the virtual rotation were illuminating. In general, the students were pleased with their experiences and grateful for the rapid creation of the virtual rotation during a difficult situation. They felt the virtual rotation was more focused at their educational level and needs compared to some of their previous in-person rotations.

Specific comments regarding the quality of teaching included:

> *The dedicated and directed teaching times were superior to those of the other inpatient teams that I was on. Because it was part of a student-focused curriculum, it felt like a course on ICU basics rather than me slipping into a random four weeks and getting whatever didactics happened to be taught.*
> *I think [the preceptor] did an excellent job facilitating the virtual ICU experience, and she arranged a variety of activities which seriously helped to enhance our experience and knowledge about critical care.*

The students critiqued the relative lack of patient encounters and opportunities for interprofessional experiences. Specific comments in

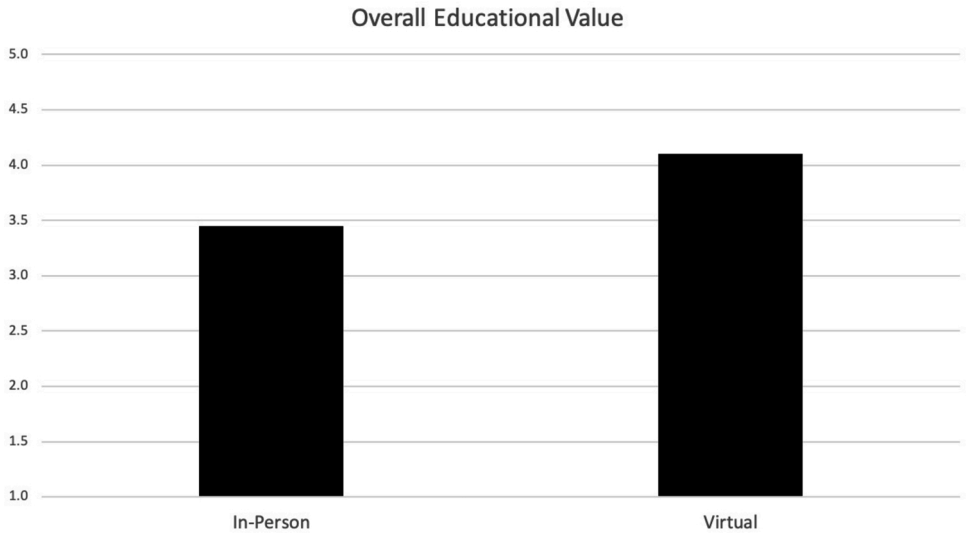


**Fig. 2.** Students' overall assessment of the educational value of the virtual versus the traditional in-person curriculum.

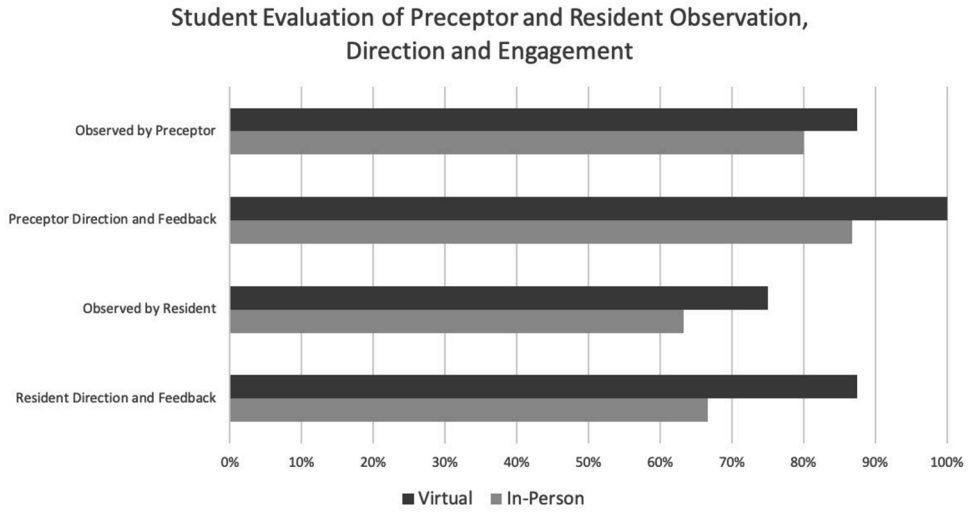


**Fig. 3.** Students' assessment of preceptor/resident engagement with students in the two curricula.

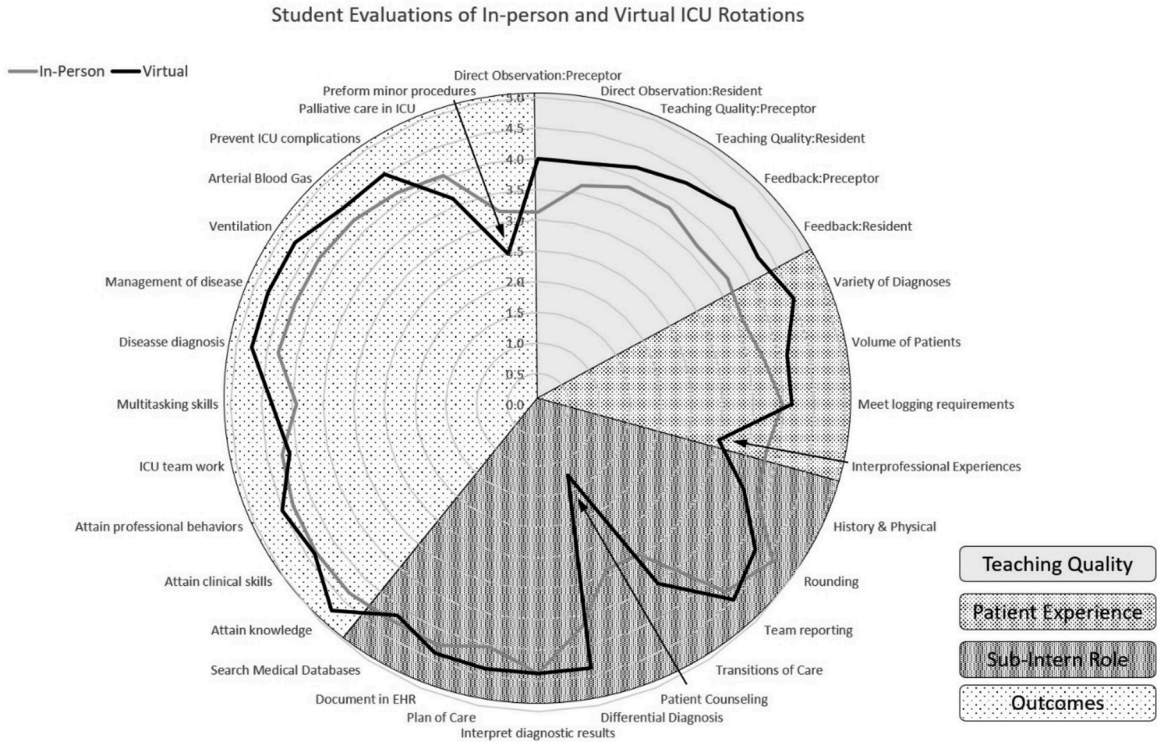


**Fig. 4.** Radar plot of all student evaluations showing parallel assessments of the virtual versus in-person curricula except as noted by the arrows.

this area included:

*Interprofessional experiences were abundant when I was physically in the ICU; no such experiences virtually.*
*I personally did not enjoy seeing patients virtually. Being an ICU elective, the patients I could talk to were not able to give me a good history and interacting virtually made this worse due to barriers from the technology and differences in our ability to utilize it.*

The students were generally pleased with their opportunities to actively participate as a sub-intern during a virtual rotation while specifically calling out the challenges in specific areas like counseling the patient or family. Specific comments in this area included:

*Although it was virtual, I had a great experience. The patient presentations, hand offs, and topic presentations were much better than the majority of my rotations as they were designated for allowing students to lead and be taught, rather than being squeezed in between other tasks if there was any available time, and cut off early in order to move on with patient care.*

The students rated their experiences in utilizing the telemedicine application at 4.0 (very good). They reported some technical issues involving the audio and video telemedicine connections and expressed concerns regarding patients' unfamiliarity with the technology as well. Their experiences with the alternate/SUP EHR environment was rated at 4.7. Students appreciated the ability to become familiar with critical care charts in the EHR while practicing note writing and ordering.

Students recognized the didactic value of the virtual instruction format and use of the SUP EHR:

> *Coming out of this virtual learning we can begin to realize how greatly virtual training can augment our medical training and should be seriously considered whether to integrate it into future medical students' training.*
> *I liked having access to EPIC-SUP. It allowed us to still write notes, put in patient orders, and become familiar with ICU charts. It also allowed us to have access to a range of patients that were interesting to us.*
> *…the ability to video into a patient's room exceeded my expectation and augmented my training.*

## 4. Discussion

Our experience with the creation and delivery of a virtual CCM rotation within a week of closure of our clinical campuses to students due to the SARS-CoV-2 pandemic certainly proves the old proverb "necessity is the mother of invention." The lessons that we and others have learned from this unavoidable exercise have the potential to change the future of medical education and the delivery of medical care.

It is clear from this experience that telemedicine and other health information technology can deliver significant portions of a clinical curriculum. Although our pilot was very limited, it appears the students were accepting of this alternate method of education and evaluated it as being essentially equivalent in many ways to a traditional in-person rotation. Telemedicine and secure video technologies can allow students to follow patients, obtain a history and limited physical exam, utilize diagnostic and clinical reasoning skills, interact with the clinical team, perform handoffs and present and discuss patients effectively with faculty.

Several strengths and weaknesses of the virtual experience emerged and will require further thought and study. One of the strengths our students consistently reported was that they were the focus of the virtual educational experience and felt the rotation was built specifically for their needs. They contrasted this virtual experience with their other in-person rotations from both third and fourth years where student education was only one of many competing needs. Several specifically commented on the rigorous structure and educational process the course director created as most instrumental in helping to pull the experience together. This clearly represents an opportunity to improve on the educational value of in-person rotations in the future. Virtual delivery, when circumstances compel, of a common rotation curriculum can provide context and meaning to all students on a rotation by utilizing actual patients the students can follow. This will help to keep focus on the students' education during clinical rotations.

It was also revealing that the use of a copy of the EHR, such as the SUP environment, can be a valuable educational tool. Our students were able to use one-day-old copies of actual patient records to practice writing notes and placing orders, not feasible in the actual production version of the EHR. Preceptors were able to adequately assess the student's abilities in these areas using the SUP EHR including feedback on student presentations, their notes, and during hand-off practice. A drawback is that students' notes and orders no longer are in the SUP environment the next day (as it is overwritten each midnight) so they had to remember their contributions to compare to what actually occurred.

Although this pilot was in the rarified specialty of critical care, our experience shows that the technology is adaptable to student needs. Educators could use this technology in any specialty, including primary care. The technology is both scalable and available especially as telehealth in general has expanded and will be persistent even after resolution of the Covid-19 pandemic. We achieved good results delivering a virtual rotation in a setting where patients are complex and acutely ill, suggesting this could also be applied effectively with patients in a lower acuity setting making this relevant to primary care education.

Telemedicine is an emerging topic that we recommend be instituted into the regular medical school curriculum. It is a potential area for expansion during in-person rotations as well where we can utilize non-production environments to give students practical experiences in using the EHR in these and other ways, such as problem list maintenance, effective use of decision support, and medication reconciliation, while not impacting real-time patient documentation.

The pilot also exposed several apparent gaps that need further assessment. Students, faculty, and patients all had technical issues with connectivity and adequate audio and video connections, as well as a general unfamiliarity with telemedicine. The initial platform for student-patient interactions had limited communication channels and hardware across our platforms and intensive care units, so we added another application which utilizes generic tablets loaded with appropriate software to provide bidirectional communications when the first system was unavailable. It also became clear that critically ill patients, due to their medical conditions and the effects of CCM treatments, are not the ideal patient population for communications through virtual tools. The virtual environment is unsuited to providing students any practical experiences with physical examination or procedural skills. The students ranked patient/family counseling and interprofessional experiences more poorly than an in-person rotation. Finally, students cannot perform procedures virtually which we anticipated would be an unavoidable consequence of the protective restrictions.

Better telemedicine training for our students, faculty, and patients will help address some of the awkwardness of the telemedicine experiences and may help mitigate some of the technical issues. Current medical students, being the first generation familiar with digital and social communication tools for most of their lives, can help lead this transformation. We will clearly need to become more thoughtful on what types of patients represent the best educational opportunities for students to practice telemedicine skills. At the current time there is not any foreseeable solution to the lack of hands-on physical examination and procedural skills, yet we are hopeful that virtual reality software and hardware will afford those opportunities in the future.

Despite our apparent successes, ours is a small pilot rapidly conceived and conducted in an emergency and should not be used to draw any final conclusions regarding the value of virtual clinical experiences in general. One next step, already underway, is to create additional virtual student clinical rotation experiences without the development time limitations of this initial rotation while applying lessons learned from our CCM pilot. As our system transitions back to in-person rotations we will still face some challenges and restrictions due to the pandemic that will require incorporation of telemedicine technologies. Ultimately we believe that telemedicine will become standard in clinical education. We are striving to leverage its use to optimize our learners' education by ensuring a foundational clinical experience and comparability across campuses.

Summary table

**What was already known on the topic:**

- Telehealth was a widely available but underutilized technology prior to the SARS-CoV-2 pandemic
- Telehealth was underutilized for medical education

**What this study added to our knowledge:**

- A curriculum to enable virtual bedside teaching during a pandemic using telehealth technology is a viable and satisfactory substitute for in-person training
- This study shows that this methodology works in a critical care setting and we believe can be scalable and suitable for primary care education

## Studies in humans

As a survey study without involvement of experimental drugs or devices, institutional review board approval was not necessary.

## Authors' contributions

MS is the director of the medical curriculum of the medical school; CL was the lead preceptor for the telehealth program; RS and BL conceived of and helped develop the technical aspects of the program. BL wrote the first draft of the manuscript. All authors contributed significantly to the intellectual content of the paper.

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## Submission declaration

This work has not been published previously, nor is it under consideration for publication elsewhere. All authors have approved the paper for submission.

## Declaration of Competing Interest

The authors report no declarations of interest.

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