

Interview with Nuclear Medicine Technology Educators on the Impact of COVID-19 on Programs, Outcomes, and Employers

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Coronavirus disease 2019 (COVID-19) has influenced changes at health-care facilities. The editors of *Journal of Nuclear Medicine Technology* were interested in learning how the pandemic has affected nuclear medicine technologists (NMTs) and NMT programs. We (two of the associate editors and NMT educators) invited NMT educators to participate in a qualitative interview study to get perspective on the effects of the pandemic on their programs, institutions, and communities. The interview questions were shared with participants ahead of their scheduled interviews. Four educators were interviewed, and selections from their comments are included in this article. The comments revealed that students seem anxious but inquisitive and ready for the changing health landscape. Most programs have seen changes in student retention, with most programs seeing an increase in enrollment. COVID-19 has made educators and students think about flexibility and how to benefit from hybrid learning. Programs have seen challenges regarding personal protective equipment and vaccine requirements. All interviewed educators noted the excellent job market for students, particularly that many job offers include incentives or sign-on bonuses. The conclusion was that COVID-19 forced programs to adapt to many of these changes, enhancing student learning. NMT educators are excited about the future of molecular imaging and NMTs.

Key Words: COVID-19; educator; NMT program; employer; students

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Without a doubt, coronavirus disease 2019 (COVID-19) has had a worldwide impact. COVID-19 has put a major strain on health-care facilities and health-care workers. Since February 2020, health-care employees have been on the front lines of the pandemic, which has led to many challenges, including increased physical demand, scheduling changes, personal health risks, burnout, and staffing shortages. Health-care systems are seeing increases in employee turnover due to job changes, early retirement, and exits to other professions (1). The molecular imaging world has experienced this impact

firsthand, with changes to studies, protocols, staffing, and education. The editors of *Journal of Nuclear Medicine Technology* were interested in learning how this impact has affected nuclear medicine technologists (NMTs) and NMT programs. We (two of the associate editors and NMT educators) invited NMT educators to participate in an interview study to get firsthand information on how this impact has been seen in their communities. The purpose of this article is to educate readers on the trends and changes that NMT educators have seen because of the pandemic.

MATERIALS AND METHODS

The goal of this semiquantitative interview study was to get a first-person perspective from current NMT educators on the effect of the pandemic on their NMT programs, institutions, and communities. The interview format was an informal question-and-answer session. Convenience sampling was used to invite U.S. NMT educators to participate, with a goal of including individuals from different geographic areas and different types of programs (associate's degree and bachelor's degree; in-person and remote learning). Six educators were invited, and 4 accepted. Two interview dates were needed to accommodate the interviewees' schedules, the first being January 25, 2022 (with 3 of the NMT educators) and the second being February 3, 2022 (with the fourth NMT educator). The participants agreed to be identified and for their comments to be recorded.

The participants were Jay Smith, University of Iowa, Iowa City, IA; Julie Bolin, GateWay Community College, Phoenix, AZ; Grace Tursi-Wenzler, Bronx Community College, New York, NY; and Leesa Ross, Chattanooga Community College, Chattanooga, TN. Before the interviews, we sent the questions to the participants; these questions appear as subheads in the Results section of this article and were based on previous discussions between ourselves. We conducted the recorded interviews via Zoom and then transcribed them. Many of the answers are included here. We chose to use actual quotations from the interviews so that our perceptions of the answers would not be a factor.

RESULTS

How Have Your NMT Students and Your Applicants Been Changed, or Been Affected, by COVID-19? In What Ways Are They Approaching Their Future in the NMT Field Differently?

Overall, the group felt that incoming students seem inquisitive and ready to work in the health-care setting. NMT programs have seen the effects of anxiety but also a willingness of students to adapt to the changing health landscape. Most

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programs have seen changes in student retention, with many programs having an increase in NMT enrollment even if overall institution enrollment has dropped.

Ross: “The group that began the year with COVID in full effect [had] very high anxiety. They seemed to stress about everything in life and in school. In our opinion, it was because they were on edge living through a pandemic, and that spilled over into everything that they did. Everything seemed urgent. They were, however, the most social class we have had in a long time through online outlets. The second year of COVID, when people became more relaxed over the pandemic, the group seemed a little less anxious.”

Tursi-Wenzler: “Program retention [in] the last 2 years with COVID ... I feel like it’s been a little bit challenging. The pandemic has made [it] way more challenging for students to commit to clinical [rotations] and stay in the program.”

Prekeges: “It seemed like COVID hit a lot of people really hard in terms of making major life changes [in] that they were planning to go in one direction and [now] they’re going in a completely different direction. But the interest that I’ve had for my upcoming application cycle has been much higher, and much higher quality. It almost seems like there’s a group of people out there [who] have decided that this COVID thing is here, they’re going to take it by the horns, and they’re going out there to work in health care.”

Ross: “I think that they seem to be more inquisitive; maybe they’ve had to do more research online. And they are ... getting used to doing research by being online for things instead of just being in the classroom. But they seem to be more inquisitive about everything. They want the details, [the] step by step of everything.”

How Has Your Program Enrollment Been Affected?

Bolin: “We’ve actually had an increase in admissions, and I think that part of it [is that] we were just approved for a bachelor’s degree program. And our goal for the bachelor’s degree is to offer dual certification.”

Smith: “We’re seeing our numbers stay pretty steady. We have an “Introduction to the Radiation Sciences” course. It’s a 1-credit course offered every semester that’s really open to anybody. So, it does a great job of bringing people in, and we get a lot of prospective nursing students and pharmacy students and everything else, all the allied health-care staff. Our numbers are trending up across all the modalities.”

Bolin: “The students anticipate, going into a health-care field, that [they are] going to be around people who are sick. They’ve just accepted that as this is [the] working environment, and it is what it is, it’s not going away.”

How Have Overall University/College Applications Been Affected?

Smith: “[The] university as a whole [was] down in 2020, by 10%. It’s bounced back a little bit, a point or two. The total applicants in the radiation sciences are up, but most of that increase is due to ultrasound.”

Tursi-Wenzler: “The university as a whole is definitely down. But knock on wood, the nuclear medicine program [is] not. We’re, if anything, getting more applicants in.”

Bolin: “We were down like 14% approximately across all of Maricopa [Community College District]. In terms of allied health, our numbers have never dropped. All of the allied health programs have wait lists; I think nuclear medicine has the smallest wait list currently. And it’s 2 years minimum.”

Ross: “I have a feeling my applicant pool is actually going to be higher, which is odd because enrollment is really low at the college. We’re [down significantly from] what we used to be, from 3 or 4 years ago.”

What Changes Have You Made to Your NMT Program to Address COVID? Are These Driven by Your Institution, Your Clinical Sites, or Your Employers?

The general thoughts of the group for this question included how much COVID-19 has made educators and students think about flexibility. The initial impact of changing courses because of COVID-19 had a major effect on pedagogic growth. Many programs used this opportunity to have remote and hybrid learning, which has continued to benefit programs.

Bolin: “We went through a terrible transition process when COVID first hit, of trying to transition all of our classes to online. And there was a huge learning curve to that. But I think that we’ve primarily gotten that figured out. And we’ve all adapted and figured out ways that we can provide quality education to our students, even if we have to transition out of the in-person setting into more of a virtual setting. And I think all the allied health-care folks have really stepped up to the plate and made their courses very user-friendly. We’re also flexible with our students ...; if they have to miss a clinical day, we have built in extra hours. So, they typically don’t suffer, or they don’t have to be delayed. We, in fact, never delayed any of our graduations for our students.”

Tursi-Wenzler: “With the original online transition, the hardest part was ensuring exam integrity. And [after] our students ... were hit with the pandemic in 2020, we definitely had a drop in board exam [scores]. Since [then] we’ve been able to at least get the midterms and final in person.”

Smith: “I think we’re just going to be hybrid from now [on]. Because as soon as we think, you know, everybody’s back, somebody is out again. So, we just roll with it; we just assume we’re going to have to [use] Zoom. The students seem to have no problem adjusting to that.”

Ross: “[My program was already mostly online, so normally] we do our radiation badge exchange on-site, and while they’re there, we usually do some kind of lab with them. [When COVID hit], we canceled the lab. And then, when we did start labs back, we had to split them up because we had 15 students, and we limited it to 10 [people], including instructors, in the classroom at a time.

And so, we split them into 2 groups. [Now] it's opened back up, and now we don't have any limits."

Bolin: "I record all of my lectures ahead of time. And they're always posted and available to the students. So, anyone who has to miss a class, they are not missing content in any way. And then we offer a lot of office hours. I'm not sure why, [but] I haven't been able to figure out what I can do to promote them wanting to reach out to me a little bit more; it's just that some students will and some won't. What I have found is that if I offer ... an image review session, or a virtual check-in, or ... 'if you have questions, drop in during this time,' a lot of students will show up. Not all of them have questions, but at least they are present. So, I can check in with them."

Tursi-Wenzler: "Transitioning online was definitely challenging in a lot of ways; we've pretty much been online or hybrid since the pandemic hit. The Remind app has been a huge help. If something happened, I could just text the students quickly; I know that they're receiving the information."

Ross: "I meet with students on WebEx, [as well as with] applicants, potential students, and my advisees. We conduct our interviews through WebEx, [and] we were going to convert that back. But we liked doing that because we could get clinic supervisors from other areas to log on and help with the interviews. Because they didn't have to drive, they could log in from work to do the interviews."

Bolin: "[When we first transitioned back to in-person learning, the students] didn't like it. They felt like it was a waste of time to have to be present [traffic, getting alternate childcare]. My students who started virtually kind of want to stay that way. My students who started in person are terrified that they may have to transition into a virtual environment."

Prekeges: "There were always those people who, when I said, 'Well, I can get you in the program, but it's going to be [at a distant location] and not here in your area,' they'd say, 'Oh, no, no, no! I need to be in the class[room] with you.' But once they experience not having to actually get in their car and drive, everybody becomes a convert to the virtual environment."

Frye: "I have anxiety going back and forth [between in-person and virtual learning], [and] I know this stuff [because I teach it], right? So, I imagine the stress and the anxiety for these poor students [is even greater]."

Ross: "Even though everybody has gone back to the campus, [the college is] still not pushing you to be on site. With [our program] being online, we've pretty much been working remotely, most of the time, as well. But it was interesting to see this [shift in the college's stance], because [my colleague] and I had been asking for years to be able to work out of our house. Now they're like, 'you can stay home as much as you want if you don't have any meetings or anything on campus.' They're just not pushing you to be on campus unless you have set times that you might be with students."

Tursi-Wenzler: "I think our 5-year plan is mainly to really use what we've learned during the pandemic, and try to use

that in ways that are going to benefit us and the students, [such as] test administration or organizing grade assessment, which is such a huge part of [Joint Review Committee on Educational Programs in Nuclear Medicine Technology] standards and requirements now. And I think the pandemic has really made me realize how much the students have on their plates. The college on my end has excellent counseling services. [If I sense a student is struggling,] I can direct them to somebody who is trained to talk to that."

Bolin: "What I've learned is that we need to be a little bit more flexible, and we have the tools that we can remain flexible but [still] provide quality education. And I think that moving forward, I would like to see us implement some of the changes that we've made. I'd like to see us keep some of those."

What Are Some of the Changes You've Experienced Particularly Related to COVID-19 Requirements in the Clinical Setting?

In the clinical setting, COVID-19 created challenges regarding personal protective equipment and vaccine requirements.

Bolin: "We pay for the students to do the N95 fit testing. And at one point, we were having to send all of our students with their own [personal protective equipment]."

Ross: "Most of the sites are requiring that [students] have an N95 mask ... Before, they just could wear any type of mask, but now it's an N95. And the sites are supplying them. And then, of course, all of them are starting to require the [COVID-19] vaccine."

Tursi-Wenzler: "In New York State, they're requiring that all health-care employees [including students] [be] vaccinated. There's been very, very few medical exemptions, so all the students pretty much have to be vaccinated. So, that's something we're trying to make very clear in information sessions ... And the college has definitely amped up the testing. So, they have on-site testing that they're doing at the college, which has been helpful."

Frye: "[The University required] that we be fully vaccinated as of the fall semester—students, faculty, and staff—and now they require boosters too. Adding that navigation is difficult."

Ross: "[The students] got back in the clinic really quick. The sites are seeing some revolving of employees, some transitioning; people are switching hospitals and relocating and moving. So there is some adjustment there. But I think that the really big difference is [that] they're not allowed to work with COVID patients."

What Trends Are You Seeing on the Employer Side?

All educators expressed how great the job market is for students, particularly in that many of these jobs include incentives or sign-on bonuses. These educators indicated a need to fill positions from which people had retired, and some stated that new positions are being created in their areas.

Smith: "I've just been dying to say how good the job market is for students. [Our seniors] graduate May 15, and 2 or 3 of them have accepted job offers already. Earliest ever! And a couple of them are fending off multiple job

offers because pretty much everywhere they send a resume to, even blindly, they'll just get a job offer."

Tursi-Wenzler: "[In] the last 2 years, students have not only received multiple job offers but [also] changed jobs already. I had a couple of students [who] got hired right after they graduated in May and then [took] a better job or one that they were really hoping for within that short time period."

Bolin: "There's lateral and upward mobility even for technologists who don't seem to have years... of experience. And here, a lot of our clinical sites are wanting and preferring technologists [who] are dual-certified. And I think that that's more prominent in our clinic setting, as opposed to our hospital setting."

Ross: "We're regional, so we try to keep our students separated so that we don't flood the market in one area. But we did take 6 in Chattanooga last year, and I thought, oh my goodness, they are not going to be able to find a job or anything. And then they all were able to find jobs that [they] wanted.... One just decided to be a stay-at-home wife after she went to school. She never even looked. But 5 of them found jobs, and one of them even got a \$15,000 sign-on bonus here, local, where there's a school."

Are Employers Worried About Too Many or Too Few Technologists?

Smith: "In the Midwest, it seems they're just filling retirement positions."

Bolin: "So in our area, in my immediate area, we're actually seeing quite a bit of expansion in terms of some positions being added to existing hospitals, some hospitals choosing to have smaller satellites, and then a huge explosion in outpatient, particularly, PET/CT, as well as cardiac. We're doing a lot of cardiac PET now, and some of our clinical partners are expanding their outpatient cardiac sites."

Tursi-Wenzler: "I think that there's been more filling [of] retirement [positions] in comparison to saying, 'Let's create another technologist position in our department.' But I do think that PET/CT is definitely increasing. So, that has been adding some... jobs in the department."

Bolin: "We've seen some transition into the industry setting as well. For some of our technologists who were either in education or in the clinical setting, and [have] opted to transition into industry, there's just more positions available that are in the industry setting."

Ross: "It seems to be regional. Some areas are sending technologists home early due to a lack of patients, and others are struggling to find technologists to handle the workload or fill department needs."

If Too Few, Are There Changes for Pay or Other Incentives Being Offered?

Smith: "I think this year, we're going to see significant increases because everybody knows everybody's hiring. We're seeing, with existing technologists, our department... trying to get a recruitment and retention process or program in line, and they know that pay is going to be a big part of that."

Bolin: "The initial starting salary is higher. And then, in addition to that, especially if you're in an outlying area, they're really increasing the wages in some way, whether it's retention bonuses, relocation assistance, or hiring bonuses. It's a good time to be a clinical technologist."

Ross: "The wages seemed to be about staying the same. I think if people try to negotiate, they might be able to get a little bit. But what we found with the sign-on bonus [for] our student is they wouldn't [negotiate] the hourly wage, but they were offering a \$10,000 sign-on bonus. She asked for more hourly wage, and when they didn't do that, her counteroffer was a bigger sign-on bonus. And they were, like—'Sure, you can have more money on the sign-on bonus.' They didn't even flinch."

What Are Your Thoughts/Hopes for the NMT and Radiology Field over the Next 5 Years?

The consensus for this question was that the requirements for entry-level NMTs keep increasing, and many of these requirements address multimodality training. Diversity, equity, and inclusion will be increasingly demanded, and radiopharmaceutical and theranostic studies may expand the profession.

Bolin: "The education standards for NMTs continue to just go up.... We always want to say that we teach for competent entry-level technologists, but that entry level is not just clinical anymore; it's kind of expanding into other areas."

Smith: "How do we work that into the curriculum as educators? How do we fit this stuff in our programs when they're jam-packed already? But you know, we've got to draw the line somewhere. And we need to keep our eye on the ball, which is producing good entry-level technologists. [We need to make] sure it's market-driven. We don't want to be requiring [students] to learn stuff that they don't need to know as entry-level nuclear medicine technologists. I think we need to include theranostics."

Bolin: "I think that we're going to see an explosion of radiopharmaceutical development, with all of the advancements in radiochemistry and radiopharmacy. I think that the pharmaceutical development and potential theranostics applications are going to continue to increase. And I feel like we need to own that as nuclear medicine technologists, because otherwise, somebody is going to steal it."

Ross: "I'm hoping that theranostics continues to take off and that we see even more radiopharmaceuticals approved. We've seen an increase in PET; I'd like to see something new in basic nuclear medicine. And then who knows where PET/MRI is going to go. It seems to be slowly increasing the number of units over the United States."

Bolin: "Each state has... unique working conditions for our technologists. So, it can be difficult to create a program where you're trying to train your students to be able to work in nuclear medicine, in general, but then state-to-state specifics make that very difficult. And [it is also difficult] to incorporate additional curriculum whenever you are confined to only being able to have a program that is a certain length."

Bolin: There's a huge drive, at least in certain areas, for multimodality technologists. So, they're wanting us to have technologists that ... I almost want to say, [are] like radiology technologists or medical imaging technologists, not just nuclear medicine [and] not only CT."

Tursi-Wenzler: Then, for employers, I really just think the best advice is to give incentives for additional certifications; it's going to benefit them in the long run if they can have a technologist [who] can do multiple different studies."

Bolin: "I think that some of our students are now asking for, or our clinical partners are expecting, more about diversity, equity, and inclusion and [new] courses or established courses specifically relating to that. And I find that I'm kind of challenged in figuring out where to incorporate it because I just don't have any more space."

DISCUSSION

The passion and dedication of the interviewees to their profession were evident. They are excited for their students, the future of molecular imaging, and the growth of the nuclear medicine field, including more employment opportunities, more tracers, and the expansion of theranostics.

Overall, the group was impressed by the adaptability and intelligence of their current and incoming students. Educators were forced to adapt programs when the COVID-19 pandemic started, and many of these changes have enhanced the NMT programs with flexibility for student learning.

Most programs have seen an increase in NMT enrollment even if overall institution enrollment has dropped. It was also clear that the NMT students are coming into a great employment market that includes incentives or sign-on bonuses.

As we continue to adapt to the new nuclear medicine environment in a post-COVID-19 health setting over the next few years, it would be beneficial to conduct additional research on this topic, using informal polling with qualitative questions and interviewing more educators in nuclear medicine technology and in radiology in general.

CONCLUSION

The interviews showed that NMT educational programs have been significantly affected by the COVID-19 pandemic, with a considerable increase in the flexibility needed to address educational issues. At the same time, approvals of new diagnostic and therapeutic radiopharmaceuticals have increased the content needed for entry-level practice. Programs have looked toward the future with revised curriculum requirements and increased use of virtual formats. The interviewees made particular note of the hot job market for NMTs. Graduates are getting multiple job offers nationwide, with incentive pay often included. Employers are facing labor shortages in some geographic areas just as the business of nuclear medicine is expanding. The Bureau of Labor Statistics predicts 1,500 job openings a year for NMTs (2). Industry leaders have predicted as much as a 30% expansion of our business in the next decade, based on new radiopharmaceuticals and new theranostic techniques. At the same time, many long-time technologists are approaching retirement. These trends point to a continuing need for new graduates in the field. Telehealth is not an option for NMTs; we are front-line health-care professionals. Both educational programs and employers are important to the future of our field.

DISCLOSURE

No potential conflict of interest relevant to this article was reported.

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