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Training in cytopathology in times of social distancing: a comparison of remote vs. traditional learning

Introduction

Residency and fellowship training in cytopathology unexpectedly became challenging during this past year due to the novel coronavirus 2019 (COVID-19) pandemic. Not much was known at the onset but soon the genome of coronavirus SARS-CoV-2 was sequenced¹ and public health measures such as “social distancing”, mask wearing, and hand washing were implemented to curb the transmission of disease. Social distancing was defined as a distance of at least 6 feet be maintained between any 2 individuals.² This prevented gatherings and led to closures of many non-essential services and institutions. Hospitals and health care facilities maintained essential health care work and reduced elective procedures.³ These measures led to a marked decline in the volume of specimens received by anatomic pathology/cytopathology laboratories and decreased the number of fine-needle aspiration (FNA) procedures performed.⁴ The trainees in pathology—both residents and fellows—were required to stay at home either entirely or partly during the early period of the pandemic under the recommendation of the department of academic affairs. As a result, programs had to redesign their cytopathology fellowship and residency training programs, complying with local directives and regulations while maintaining high-quality education without risking trainee health. Herein we describe our department’s remote cytopathology training program developed in response to the COVID-19 pandemic.

What were the issues identified in times of social distancing?

The issues identified due to the “stay at home” order were screening slides, case sign-out with faculty, 1-on-1 microscopic teaching sessions with cytotechnologists, performing

FNAs, attending rapid onsite evaluation (ROSE), reviewing radiology images with radiologists, participating in multi-headed microscopic consensus conferences, sharing cases among peers, taking entry and exit slide tests, learning cytology preparation techniques in the wet laboratory, and any activity that was attended by more than 10 people congregating in a room such as quality- and management-related meetings or didactic lectures in conference rooms.

How were the issues addressed?

Self-study by trainees played a major role in developing diagnostic skills and medical knowledge during remote training. To aide this, digital study sets were built utilizing the Aperio AT2 (Buffalo Grove, IL) whole slide scanner. Access was given to rotating residents and the cytology fellow using the Aperio E-slide manager to review whole slides. Trainees developed digital screening skills for gynecologic (GYN) and non-gynecologic (Non-GYN) slides. Sets of GYN and Non-GYN slides were scanned in and utilized as entry and exit tests. Online resources (Fig. 1) were provided covering a wide variety of topics in cytopathology. Our trainees availed the free webinars and lecture series that The American Society of Cytopathology made available during the pandemic. These lectures, having question-and-answer sessions, were immensely helpful with high educational value. The local cytology continuing medical education lecture series was conducted via Microsoft Teams (Microsoft, Redmond, WA) that participants joined remotely.

Remote video conferencing via Microsoft Teams and desktop sharing helped in maintaining day-to-day interactions between trainees, cytotechnologists, and faculty. The rotation began with remote a video entry interview with the Senior Director of Cytopathology to discuss goals, expectations, structure of the changed program, ideas for

1. <https://hologiced.com/diagnostic/cervical-cancer-screening/>
2. <https://CytologyStuff.com>
3. <https://digitalcytologyeducation.com>
4. Johns Hopkins <http://apps.pathology.jhu.edu/cyto/all-cases/>
5. University of Michigan, Ann Arbor <https://www.pathology.med.umich.edu/apps/slides/>
6. For books:
<https://www.clinicalkey.com/#!/browse/books/%7B%22onlyEntitled%22:true,%22facetquery%22:%5B%22subjmain:%5C%22Pathology%5C%22%22%5D%7D>
7. EUS and EBUS
 - a. <https://www.youtube.com/watch?v=2dWvqwelu-s>
 - b. https://www.youtube.com/watch?v=HJS9_tD8uO8
 - c. <https://www.youtube.com/watch?v=MLMV7bGW69o>
 - d. https://www.youtube.com/watch?v=wt_WzvNn8pg
 - e. <https://www.youtube.com/watch?v=c79j2LoNoTs>
8. Fine needle aspiration technique of palpable and ultrasound guided (online resources).
 - a. https://www.youtube.com/watch?v=mXh9en_nCBU (Dr. Britt Marie Ljung)
 - b. <https://www.youtube.com/watch?v=bJMf3WrHshY> (Dr. Zubair Baloch)
 - c. <https://www.youtube.com/watch?v=THcBELB8drg>
 - d. https://www.youtube.com/watch?v=aK_2qLZ8e-E (Dr. Britt Marie Ljung)
9. ASC channel cytopath1951 - YouTube
<https://www.youtube.com/channel/UCs2PCd826chtVe7yJ-54Qlw>

Figure 1 List of online educational resources.

projects, and the trainee's end of rotation presentation. The trainee took the entry GYN and Non-GYN slide tests remotely, wherein they screened ten GYN and ten Non-GYN digital slides virtually via the E-slide manager. These were graded and reviewed via Microsoft Teams video conferencing and desktop sharing of live microscopic slide images with the Specialist Technologist of Education and trainee. Introductory microscopic slide sessions were given to the trainees via Teams and telecytology to review GYN and Non-GYN criteria for cytologic interpretations by the Specialist Technologist of Education. These microscopic sessions were continued by a team of cytotechnologists throughout the training on a case-by-case and on-demand basis. The trainee's responsibility included contacting assigned faculty to discuss tasks for the day. This involved signing out cases via telecytology, as well as discussion of the structured question of the day. A microscopic slide session of interesting cases was given daily by the Cytology Fellowship Program Director with trainees participating remotely. The daily cytopathology consensus conference could not be held at the multi-headed microscope. It was maintained via Teams and telecytology. Trainees joined in the discussions remotely to learn from these interesting and difficult cases. They learned the utility of ancillary studies, radiologic correlation and findings, importance of history and clinical impression, and developed interpersonal communication skills. The trainees were assigned 3 online "mock" board exams that were previously developed to help prepare for board examinations. We utilized older American Society for Clinical Pathology (ASCP) GYN and Non-GYN Digital Image Programs by converting the CD-ROM images of unknown cases and histories into a cloud format with worksheets to correspond to the photos. These were submitted by the residents weekly.

To overcome the lack of hands-on training and performance of FNAs, didactic lectures were given by the Director of the FNA clinic on the basics of the ultrasound-guided FNA performance and interpretation of ultrasound images. Web sites to access videos of FNA techniques and simulations of other cytology procedures were provided (Fig. 1). A simulated ROSE FNA experience was created through video conferencing and desktop sharing of live microscopic slides. Cytotechnologists performed real-time screening of known DiffQuik-stained FNA cytology slides that were projected to trainees. Trainees performed an evaluation of the case with determination of adequacy, triaging the specimen, and other pertinent questions particular to the case as if they were attending a ROSE telecytology procedure.

Activities of the Cytology Preparatory Laboratory were covered via virtual tours, lectures, video conferencing, and telephone meetings with the laboratory supervisors and managers. Telephone sessions and video chats were also held by the Cytology Management Team to discuss quality metrics, quality assurance, quality improvement, laboratory regulations, and lab management.

At the end of the rotation, the residents presented a half-hour lecture on a predetermined topic of interest to the Cytopathology faculty and cytotechnologists via Teams. They took an exit exam like the entry exam, which was then reviewed with them via Teams and telecytology. Grades for entry test, exit test, and the ASCP GYN and Non-GYN digital image workbooks were noted and submitted to the Senior Director for an exit interview. The trainees filled out a survey at the end of their rotation to give feedback on their experience with remote learning in comparison to in person learning.

How was the remote training received?

Overall, our experience was similar to that reported by others.⁵⁻⁸ Eight trainees (4 postgraduate year [PGY]-4, 3 PGY-3 and 1 PGY-2 residents) participated in evaluating the remote learning program. The GYN and Non-GYN exit exam results for the virtual slide vs. real slide for the most promising of the PGY-4 residents were 75% and 70% vs. 77.5% and 85%, showing a slight decrease in scores. The online assignments showed the performance of the same resident to remain at the same level. In tallying the surveys we found that many trainees felt that the amount of work received was comparable to that of pre-remote learning, that they learned about the same to more than previous in-person learning, and that they would like to continue to receive their work virtually. They found the workload easier to manage with having both of the options that is to work remotely and in-person learning.

Advantages of the remote learning experience were that it allowed trainees to have more control of their learning experience, improved time management, and allowed more time for studying and research. Trainees could concentrate on projects and academic activities as they did not have their daily commute or non-academic activities.

One of the major limitations experienced throughout the remote learning process was screening whole-slide images. Scanning cytology slides that require multilayer focusing led to prolonged screening. As case volumes had markedly diminished at the beginning of the pandemic, trainees became heavily dependent on online resources. Internet access was limited due to carrier coverage or access limitations placed on personal computers by the hospital. Communication issues via email and online conferencing posed another hurdle when Teams was first introduced. It took some time for users to become familiar with the system, set up meetings, chat, and participate in remote conferencing. Lack of physical screening, no access to the physical patient, and lack of experience with radiologists were disadvantages to the trainees, hindering their ability to appreciate and understand cell morphology and radiologic images. It was difficult for trainees to receive immediate feedback or mark digital slides for clarifications and questions that often come up while screening slides. Lack of face-to-face communication poses a barrier to building interpersonal skills, such as reading body language and facial expressions.

Conclusions

We found that remote learning allowed our institution to continue teaching trainees without severely compromising the education of the trainees when compared to traditional learning, while allowing for appropriate social distancing and the ability to adhere to public health mandates, at the same time forcing faculty and trainees to embrace the virtual space and online educational content. Virtual learning allowed trainees to

learn at their own pace, focus on areas of weakness, and increase academic productivity by working on projects and reading. Our residents and fellow were able to develop and improve skills in screening digital slides, evaluating images for determination of adequacy via telecytology, and reviewing online images. Screening whole digitalized cytology slides remains challenging. Some institutions that are converting to an all-digital workflow mention digitalizing cytology cell block slides rather than smear slides.⁷

Tumor boards continue to be held remotely, with our trainees sharing live slides or projecting scanned digital images of cases that are discussed, thus saving time in not having to prepare elaborate presentations. Scanning slides led to the creation of an online digital slide library to be utilized not only for study purposes by trainees but also as a resource for cytotechnologists and faculty.

Consensus conferences are held both in person and virtually, allowing offsite residents and faculty to participate. Inter- and intradepartmental meetings continue to be virtual with increased participation at all levels. Resident end of rotation presentations are held in the virtual platform. Residents not rotating in cytopathology are able to participate without leaving their rotations.

As a result of our feedback from our evaluations and our experiences, we have partially instituted remote learning into our academic curricula and developed a hybrid program. Although remote learning cannot replace physical learning, it can be used in conjunction with physical learning, opening more doors for expanded learning techniques and help in keeping us prepared for the next unprecedented challenge. Through this experience, we have developed patience, understanding, compassion, and empathy for each other, which we intend to continue to put into practice after the pandemic ends.

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