The Future of Pathology: What can we Learn from the COVID-19 Pandemic?

The world has changed in the past few weeks. The COVID-19 pandemic and the resultant effects have created staffing problems, raising new challenges for pathology services around the world. Although not on the front lines of this health-care battle, pathologists are striving to maintain vital diagnostic services for their patients while colleagues fall ill, self-isolate, care for vulnerable family members, or are redeployed to acute health-care settings. Even prepandemic digital pathology skeptics are seriously considering the value of digital slides for remote home reporting during the periods of self-isolation. Digital pathology has the potential to future-proof pathology services, allowing for more flexibility in how services are delivered, and adding resilience to our important diagnostic services. This utility is highlighted in the current near-global lockdown.

The rapid transferability and flexibility of the digital slide medium have long been touted as the key advantages of whole-slide images over glass slides. Remote digital working with rapid reassignment of cases to the available qualified diagnosticians could play a vital role in sustaining key histopathology services during times of disruption. Virtual networks of pathologists could provide specialist cross-cover, while self-isolating pathologists could continue to provide diagnostic support from home.

The COVID-19 pandemic has highlighted many areas which require further work in order to achieve this. More research is needed regarding the use of home computing hardware for remote diagnosis. While some individuals have experience with remote home reporting, little work has been done to determine optimal conditions for home reporting of digital pathology slides, including technical and training considerations. Viewing hardware used for primary diagnostics on digital slides prepandemic range encompasses a range of medical-grade and consumer-grade screens, and there is a marked variation in the network bandwidth available at pathologists' homes.

The Digital Pathology Committee of the Royal College of Pathologists has issued emergency guidance on how to risk assess home reporting of digital slides on a case-by-case basis,[1] and an article has recently been published in this journal highlighting the key training, validation, and environmental and hardware considerations.http://www.jpathinformatics.org/downloadpdf.asp?issn=2153-3539;year=2020;volume=11;issue=1;spage=12;epage=12;aulast=Williams;type=2. In the USA, the College of American Pathologists, has established a practical FAQ website (https://www.cap.org/covid-19/remote-sign-out-faqs) to respond to the myriad of questions that have arisen regarding regulatory compliance and privacy concerns,[2] etc., These resources, precipitated by an emergency situation, are an excellent start, but the pathology community needs to develop broader, evidence-based guidance and standard operating procedures for digital pathology, particularly in the home-working environment, similar to those established in the radiology domain.

The pandemic has highlighted the lack of readiness of many hospital and pathology information technology (IT) systems to "go digital." Only a minority of pathology departments have access to digital pathology systems validated for clinical use sufficient for small-scale remote working. Fewer still have the capability for 100% scanning of surgical pathology samples.[3] Many pathology departments, now eager to implement remote digital reporting, find themselves stymied by inflexible IT systems, slow-moving information governance processes, and scanners that have yet to be validated for clinical work. In the UK and USA, changes have been made to suspend or loosen government restrictions in order to accelerate the response to COVID-19. The National Health Service (NHS), England, has loosened the existing information governance constraints and delayed a "national patient opt out" from health data research,[4] whereas the Centers for Medicare and Medicaid Services has temporarily suspended the enforcement of certain Clinical Laboratory Improvement Amendments to enable remote working.[5]

Ideally, a pathologist reporting digital slides from home should be able to access his/her departmental slide archive and his/her laboratory information system from home through a high-performance, secure, virtual private network, utilizing his/her home office as an extension of their pathology department. As such, pathologists need to meet the same, or comparable standards, when reporting remotely, including patient privacy considerations (GDPR in Europe and HIPAA for the USA) and technical specifications. However, many pathologists are reporting difficulty achieving this seamless experience.

Access to laboratory information systems with integrated barcode tracking modules, together with the ability to access all pertinent clinical and pathology data related to a patient, would be ideal. Digital pathology and laboratory information systems should aim to facilitate interoperability and flexibility to support remote access. Fragmented, noninteroperable IT systems add to these difficulties, and the success of single integrated systems in coping with the evolving pandemic is notable – the UK NHS deployed the collaboration and videoconferencing system Microsoft Teams to over 1.5 million staff in 2 weeks, as it has a single, unified email system.[6] Further investment and supportive resources are needed to enable pathologists to maintain diagnostic standards off-site.

We have already witnessed how quickly the international community can mobilize their collective forces to share

experience and guidance, and disseminate best practice. The COVID-19 pandemic demonstrates how we should prioritize research into the minimum specifications for digital home reporting, and ensure that the necessary IT preparations have been made in our own pathology departments, so we can accommodate future service disruptions, whatever the cause. These sentiments are echoed beyond the world of pathology and laboratory medicine, with health-care providers at large issuing a call to arms to enable telemedicine and remote delivery of health services where appropriate.[7]

The field of pathology is poised to contribute to the understanding of this novel disease. Thus, while we should focus on sustaining critical diagnostic function, digital pathology could help enable a global research network: a decentralized approach where digital slides of COVID-19 pathology specimens can be shared to accelerate knowledge transfer.

Digital pathology offers some hope and promise for the future, and in the meantime, we should take a moment to appreciate all the laboratory, administrative, medical, and managerial staff, who continue to keep pathology services functioning, and all those pathologists providing diagnosis under difficult circumstances, whether they are reporting remotely on their laptop, or traveling to the hospital to read slides on their light microscope.

Financial support and sponsorship

BW and DT are part of the Northern Pathology Imaging Co-operative (project no. 104687), which is supported by a ≤50m investment from the Data to Early Diagnosis and Precision Medicine strand of the UK government's Industrial Strategy Challenge Fund and managed and delivered by the UK Research and Innovation (UKRI).

Conflicts of interest

- AP is on the Advisory Board of ContextVision
- LP is a consultant for Hamamatsu, and is on the Ibex Medical Advisory Board
- MGH is a consultant for Paige.AI and an advisor to PathPresenter.

Bethany J Williams[1], Filippo Fraggetta[2], Matthew G. Hanna[3], Richard Huang[4], Jochen Lennerz[2], Roberto Salgado[5], S. Joseph Sirintrapun[6], Liron Pantanowitz[2], Anil Parwani[7], Mark Zarella[8], Darren E Treanor[9]

[1]Department of Histopathology, Leeds Teaching Hospitals NHS Trust and the University of Leeds, Leeds, UK, [2]Department of Pathology, University of Pittsburgh Medical Center, Pittsburgh, Pennsylvania, [3]Department of Pathology, Memorial Sloan Kettering Cancer Center, New York, NY, USA, [4]Department of Pathology, Massachusetts General Hospital and Harvard Medical School, Boston, MA, USA, [5]Division of Research, Peter Mac Callum Cancer Centre, Melbourne, Australia and Department of Pathology, GZA-ZNA Ziekenhuizen, Antwerp, Belgium, [6]Memorial Sloan Kettering Cancer Center, New York, NY, USA, [7]Department of Pathology, Wexner Medical Center, Columbus, Ohio, [8]Department of Pathology, Johns Hopkins Medicine, Maryland, [9]Department of Histopathology, Leeds Teaching Hospitals NHS Trust, Leeds, UK

Address for correspondence: Dr. Bethany Williams, Leeds Teaching Hospitals NHS Trust and the University of Leeds, Leeds, LS9 7TF, UK.
E-mail: bethany.williams2@nhs.net

References

1. Royal College of Pathologists. RCPath Guidance for Remote Digital Pathology. Royal College of Pathologists; 2020. Available from: https://www.rcpath.org/uploads/assets/626ead77-d7dd-42e1-949988e43dc84c97/RCPath-guidance-for-remote-digital-pathology.pdf. [Last accessed on 2020 Apr 01].
2. College of American Pathologists; 2020. Available from: https://www.cap.org/news/2020/cap-calls-on-health-officials-to-give-labs-pathologists-greater-flexibility-for-covid-19-pandemic. [Last accessed on 2020 Apr 01].
3. Williams BJ, Lee J, Oien KA, Treanor D. Digital pathology access and usage in the UK: Results from a national survey on behalf of the National Cancer Research Institute's CM-Path initiative. J Clin Pathol 2018;71:463-6.
4. NHS Digital; 2020. Available from: https://digital.nhs.uk/services/national-data-opt-out. [Last accessed on 2020 Apr 01].
5. Centers for Medicare and Medicaid Services; 2020. Available from: https://www.cms.gov/files/document/qso-20-21-clia.pdf. [Last accessed on 2020 Apr 01].
6. Digitalhealth.net; 2020. Available from: https://www.digitalhealth.net/2020/03/microsoft-teams-nhs-coronavirus/. [Last accessed on 2020 Apr 01].
7. Keesara S, Jonas A, Schulman K. Covid-19 and healthcare's digital revolution. N Engl J Med 2020. [doi: 10.1056/NEJMp2005835].

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Submitted: 08-Apr-2020 Revised: 20-Apr-2020
Accepted: 21-Apr-2020 Published: 09-Jun-2020

Access this article online	
Quick Response Code:	Website: www.jpathinformatics.org
	DOI: 10.4103/jpi.jpi_29_20

How to cite this article: Williams BJ, Fraggetta F, Hanna MG, Huang R, Lennerz J, Salgado R, *et al*. The future of pathology: What can we learn from the COVID-19 pandemic? J Pathol Inform 2020;11:15.

Available FREE in open access from: http://www.jpathinformatics.org/text.asp?2020/11/1/15/286304