Remote digital pathology allows healthcare systems to sustain diagnostic services in public health emergencies. There is limited experience in the application of whole slide imaging in the primary diagnosis of lymphoproliferative disorders. Accurate diagnosis requires low power scanning for architectural patterns, cytomorphologic evaluation at high power, correlation with immunohistochemistry, and morphology guided selection of additional ancillary studies. In this study we evaluated intraobserver and interobserver variability in the primary diagnosis of lymphoproliferative disorders using digital pathology and routine light microscopic evaluation.

METHODS
Prospective evaluation of 60 cases received by clinical lymphoma subspecialty at Diagnostic Services, Shared Health, Manitoba, Canada was conducted. Needle core biopsies (5/60), incision/excision biopsies (55/60) deemed as adequate material for diagnosis, reactive and neoplasic proliferations were included. Light microscopic evaluation and diagnostic workup were performed by two primary lymphoma pathologists on routine clinical service. The slides from each case were then scanned on an Omnyx VL120 at ×40 equivalent resolution (0.275 microns/pixel). Whole slide images were integrated to and launched within the laboratory information system to a vendor whole slide image viewer. Remote review utilized consumer-grade computers and monitors connecting to an institution clinical workstation via secure virtual private network. A third lymphoma pathologist conducted digital diagnostic review of whole slide images, who was blinded to the diagnoses rendered by the primary pathologists. Sequential steps for digital diagnosis by the third pathologist (a) H&E whole slide images reviewed for each case (b) recording the choice of immunohistochemistry markers by third pathologist (c) evaluation of the digitally scanned immunohistochemistry markers performed (d) comparison of utilization and interpretation of ancillary studies for each case between the primary pathologists and the third pathologist in relation to digital pathology diagnosis (e) correlation of final diagnosis (f) follow-up light microscopic evaluation was performed by the third pathologist on all the cases after two months. The glass slides were de-identified for light microscopy, with the pathology resident holding key to connect the cases.

RESULTS
Digital images were of high quality to enable diagnostic evaluation in all the cases, with 54/60 cases showing digital to glass slide intraobserver concordance. Final diagnosis rendered in 6/60 cases using digital evaluation required further clarification by light microscopy, with concordance. Interestingly, all the 6 cases were reactive etiology. Utilization of ancillary studies by primary pathologists using light microscopy and the third pathologist using digital platform showed (1) immunohistochemistry: 11.3 vs 9.3 average (2) Flow cytometry studies performed in 34/60 versus 0/60 cases (3) no discordance in utilization of molecular studies and fluorescent in situ hybridization.

CONCLUSION
Our experience shows high intraobserver diagnostic concordance between digital and glass slides, without compromising optimal patient care. Digital evaluation of reactive lymphoid proliferations requires longer learning curve than lymphomas. Utilization of ancillary studies was consistent with the diagnostic algorithms followed by individual pathologists in routine practice, and was not influenced adversely by digital pathology.

SELECTED REFERENCES