

CADTH Reference List

# Digital Pathology Using Primary Case Sign-out

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## Key Messages

- Two non-randomized studies were found regarding the clinical utility of digital pathology using primary case sign-out.
- Six systematic reviews (1 with a meta-analysis), 9 randomized controlled trials, and 21 non-randomized studies were found regarding the diagnostic accuracy of digital pathology using primary case sign-out.
- One economic evaluation was found regarding the cost-effectiveness of digital pathology using primary case sign-out.

## Research Questions

1. What is the clinical utility of digital pathology using primary case sign-out?
2. What is the diagnostic accuracy of digital pathology using primary case sign-out?
3. What is the cost-effectiveness of digital pathology using primary case sign-out?

## Methods

### Literature Search Methods

A limited literature search was conducted by an information specialist on key resources including MEDLINE, the Cochrane Database of Systematic Reviews, the international HTA database, the websites of Canadian and major international health technology agencies, as well as a focused internet search. The search strategy comprised both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. The main search concept was digital pathology. CADTH-developed search filters were applied to limit retrieval to health technology assessments, systematic reviews, meta-analyses, or network meta-analyses, randomized controlled trials or controlled clinical trials, and economic studies. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2016, and October 4, 2021. Internet links were provided, where available.

### Selection Criteria

One reviewer screened literature search results (titles and abstracts) and selected publications according to the inclusion criteria presented in Table 1. Full texts of study publications were not reviewed.

## Results

Six systematic reviews<sup>1-6</sup> (1 with a meta-analysis<sup>1</sup>), 9 randomized controlled trials,<sup>7-15</sup> and 22 non-randomized studies<sup>16-37</sup> were identified regarding the clinical utility or diagnostic accuracy

**Table 1: Selection Criteria**

Criteria	Description
<b>Population</b>	Patients suspected of disease requiring histopathology for clinical diagnosis
<b>Intervention</b>	Digital pathology using primary case sign-out in any setting (any digital pathology including whole slide imaging, algorithms for dedicated morphometric analysis, algorithms employing artificial intelligence/machine learning, natural language processing, and novel microscopic techniques [e.g., multispectral, Fourier transform infrared and other infrared, and second harmonic generation imaging])
<b>Comparator</b>	Standard microscopic evaluation in a lab setting
<b>Outcomes</b>	Q1: Clinical utility (e.g., benefits and harms, adverse events, safety considerations [i.e., correct patient diagnosis], patient management, patient satisfaction, quality of life). Q2: Diagnostic accuracy (e.g., sensitivity, specificity, concordance) Q3: Cost-effectiveness (e.g., cost per quality-adjusted life-year gained [i.e., incremental cost-effectiveness ratio], cost per adverse event avoided)
<b>Study designs</b>	Health technology assessments, systematic reviews, randomized controlled trials, non-randomized studies, economic evaluations

of digital pathology using primary case sign-out. One economic evaluation<sup>38</sup> was identified regarding the cost-effectiveness of digital pathology using primary case sign-out. No health technology assessments were identified.

Additional references of potential interest that did not meet the inclusion criteria are provided in Appendix 1.

## References

### Health Technology Assessments

No literature identified.

### Systematic Reviews and Meta-analyses

#### Diagnostic Accuracy

1. Azam AS, Miligy IM, Kimani PK, et al. Diagnostic concordance and discordance in digital pathology: a systematic review and meta-analysis. *J Clin Pathol*. 2021 Jul;74(7):448-455. [PubMed](#)
2. Dietz RL, Hartman DJ, Pantanowitz L. Systematic review of the use of telepathology during intraoperative consultation. *Am J Clin Pathol*. 2020;153(2):198-209. [PubMed](#)
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4. Araujo ALD, Arboleda LPA, Palmier NR, et al. The performance of digital microscopy for primary diagnosis in human pathology: a systematic review. *Virchows Arch*. 2019 Mar;474(3):269-287. [PubMed](#)
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6. Williams BJ, DaCosta P, Goacher E, Treanor D. A systematic analysis of discordant diagnoses in digital pathology compared with light microscopy. *Arch Pathol Lab Med*. 2017 Dec;141(12):1712-1718. [PubMed](#)

### Randomized Controlled Trials

#### Diagnostic Accuracy

7. Axley P, Mitchell R, Council L, et al. Videoconference microscopy is a reliable alternative to conventional microscopy in the evaluation of Barrett's esophagus: zooming into a new era. *Dis Esophagus*. 2021 Sep 23. [PubMed](#)
8. Samuelson MI, Chen SJ, Boukhar SA, et al. Rapid validation of whole-slide imaging for primary histopathology diagnosis. *Am J Clin Pathol*. 2021 04 26;155(5):638-648. [PubMed](#)
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14. Elmore JG, Longton GM, Pepe MS, et al. A randomized study comparing digital imaging to traditional glass slide microscopy for breast biopsy and cancer diagnosis. *J Pathol Inform*. 2017;8:12. [PubMed](#)
15. van der Wel MJ, Duits LC, Seldenrijk CA, et al. Digital microscopy as valid alternative to conventional microscopy for histological evaluation of Barrett's esophagus biopsies. *Dis Esophagus*. 2017 Nov 01;30(11):1-7. [PubMed](#)

### Non-Randomized Studies

#### Clinical Utility and Diagnostic Accuracy

16. Vodovnik A, Aghdam MRF. Complete routine remote digital pathology services. *J Pathol Inform*. 2018;9:36. [PubMed](#)

#### Clinical Utility

17. Vodovnik A. Diagnostic time in digital pathology: a comparative study on 400 cases. *J Pathol Inform*. 2016;7:4. [PubMed](#)

#### Diagnostic Accuracy

18. Ammendola S, Bariani E, Eccher A, et al. The histopathological diagnosis of atypical meningioma: glass slide versus whole slide imaging for grading assessment. *Virchows Arch*. 2021 Apr;478(4):747-756. [PubMed](#)

19. Araújo ALD, do Amaral-Silva GK, Pérez-de-Oliveira ME, et al. Fully digital pathology laboratory routine and remote reporting of oral and maxillofacial diagnosis during the COVID-19 pandemic: a validation study. *Virchows Arch.* 2021 Sep;479(3):585-595. [PubMed](#)
20. Ramaswamy V, Tejaswini BN, Uthaiiah SB. Remote reporting during a pandemic using digital pathology solution: experience from a tertiary care cancer center. *J Pathol Inform.* 2021;12:20. [PubMed](#)
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34. Saco A, Diaz A, Hernandez M, et al. Validation of whole-slide imaging in the primary diagnosis of liver biopsies in a University Hospital. *Dig Liver Dis.* 2017 Nov;49(11):1240-1246. [PubMed](#)
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## Economic Evaluations

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## Appendix 1: References of Potential Interest

### Previous CADTH Reports

39. Digital pathology technology for histopathological diagnosis. (*CADTH reference list: summary of abstracts*). Ottawa (ON): CADTH; 2021: <https://www.cadth.ca/sites/default/files/pdf/htis/2021/RB1557%20Digital%20Pathology%20Final.pdf>. Accessed 2021 Oct 7.
40. Asynchronous teledermatology consultations using store-and-forward technology: diagnostic accuracy, clinical utility, and cost-effectiveness. (*CADTH Rapid response report: summary of abstracts*) Ottawa (ON): CADTH; 2020: <https://www.cadth.ca/sites/default/files/pdf/htis/2020/RB1523%20Teledermatology%20Final.pdf>. Accessed 2021 Oct 7.

### Review Articles

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