MPOX VIRAL LOAD BY SPECIMEN TYPE AND DIAGNOSTIC TESTING IN A CLINICAL LABORATORY

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BACKGROUND

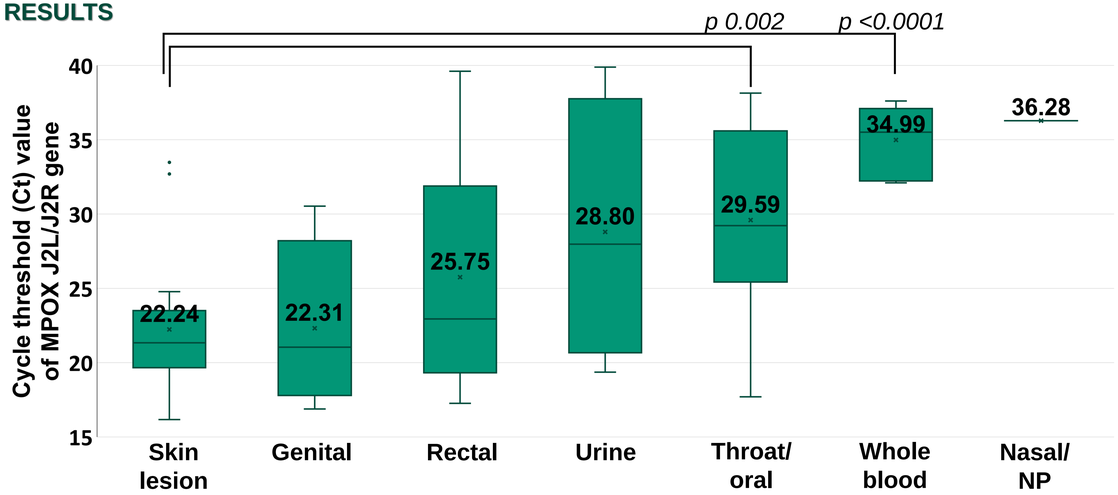
- Unprecedented person-to-person transmission of MPOX (formerly monkeypox virus) occurred in 2022, raising demand for prompt diagnostic testing.
- WHO, CDC guidelines, and some early studies suggest for the current outbreak, skin lesions are the preferred specimen type, followed by oral samples[(1-4)].
- Optimal specimen types for MPOX detection are still debated, particularly for patients presenting at early or late stages of illness, or for those with atypical symptoms (e.g., proctitis or lymphadenopathy without skin lesions).
- This study's objective was to perform a retrospective review of clinical samples submitted for MPOX testing, including analysis of PCR results from different specimen types and review of turnaround time.

METHODS

- A qualitative real-time PCR assay targeting a 106bp fragment of the **J2L/J2R** gene specific for MPOX (LightMix Modular Monkeypox Virus, TIB Molbiol, Germany) was implemented in our hospital-based clinical virology laboratory in August 2022, serving high-risk outpatient and inpatient populations.
- The assay was validated with the MagnaPure96 and LightCycler 480 (Roche Molecular Diagnostics, USA) using reference specimens provided from a public health laboratory (skin lesion, rectal, genital, and throat/oral swabs). All other submitted specimen types were accepted for MPOX detection, but non-validated.
- In this study, all clinical specimens received for MPOX detection from August to mid-December 2022 were retrospectively analyzed for:
  1. Cycle threshold (Ct) values inversely correlating with approximate MPOX viral load (statistical analysis by unpaired *t*-test, GraphPad)
  2. Percent positivity by specimen type
  3. Turnaround time

MPOX DNA was greatest in skin lesion & genital swabs. Submitting multiple specimen types did not increase diagnostic yield.

RESULTS



229 specimens submitted from 144 unique patients

Median Age: 41 years (Range: 4 to 83 years), 90.3% male

94 (65.3%) Outpatient; 41 (28.5%) ED; 9 (6.2%) Inpatient

3 patients excluded from analysis
(not at first presentation; previously diagnosed with MPOX)

41 patients at first presentation had >1 specimen submitted

16/41 patients (39%) tested MPOX positive by at least 1 specimen

Percent positivity by specimen type:
- 8/8 (100%) skin lesion swabs
- 8/8 (100%) rectal swabs
- 8/8 (100%) genital swabs
- 4/4 (100%) urine
- 1/1 (100%) nasal / nasopharyngeal (NP) swabs
- 11/12 (91.7%) throat/oral swabs
- 6/7 (85.7%) whole blood

100 patients at first presentation had only 1 specimen submitted

16/100 patients (16%) tested MPOX positive

Specimen type:
- 8 skin lesion swabs
- 8 rectal swabs

RESULTS (cont'd.)

- Of all specimens with detectable MPOX DNA, throat/oral swabs and whole blood demonstrated significantly higher Ct values (lower MPOX viral load) compared to skin lesion swabs. Sample size of nasal/nasopharyngeal swabs (n=1) was too small for statistical analysis.
- Among patients testing positive for MPOX with >1 specimen submitted (n=16), only 2 patients (12.5%) had a specimen submitted with undetectable MPOX DNA (1 throat/oral swab, 1 whole blood).
- The average turnaround time from specimen receipt to MPOX result was <24 hours (20 hrs & 12 min).
- The overall positivity rate and testing volumes decreased from 34.7% (51/147 specimens) in Aug-Sep 2022 to 19.0% (8/42 specimens) in Nov-Dec 2022.

CONCLUSIONS

- Swabs of skin lesions, particularly genital lesions, demonstrated the highest approximate MPOX viral load compared to other specimen types.
- Submitting multiple specimen types from patients did not improve diagnostic yield when skin lesions were otherwise present.
- Alternate specimen types (e.g., urine) may be considered for diagnosis when skin lesions are not present.
- Performing MPOX testing locally in a clinical laboratory enabled prompt turnaround times for timely diagnosis, clinical management and public health intervention.

ACKNOWLEDGEMENTS

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