A New Point-of-Care Ultrasound Protocol for Chronic Hepatitis B and HBV/HIV Coinfection in Zambia

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BACKGROUND

- Hepatitis B is a leading cause of mortality in Africa. However, there are implementation challenges in determining treatment eligibility for people with chronic hepatitis B (CHB) and in screening for hepatocellular carcinoma (HCC), which affects HIV/HBV coinfected people the most[a].
- Point-of-care ultrasound (POCUS) has emerged globally as a versatile, inexpensive tool used by various healthcare professionals[b].
- We evaluated a new liver Point-of-Care Ultrasound for Hepatitis (PUSH) [c], for detecting cirrhosis and liver lesions suspicious for HCC, to support HBV guidelines implementation in an HBV and HIV endemic country: Zambia.

METHODS

- We performed a real-world validation of the PUSH at University Teaching hospital, Lusaka, Zambia, from March to June 2024.
- Four nurses and 6 physicians with no experience in ultrasound (US) were trained over 3 days, to visualize 3 liver windows (epigastric, subcostal, and right transverse; Figure 1), identify 4 cirrhosis-suggestive features (enlarged caudate lobe, nodular liver surface, coarse echotexture, tortuous vascularity), and liver lesions suspicious for HCC.
- Then, consecutive adult participants (PTs) with HBV/HIV or HBV alone (all sAg-pos) underwent PUSH. We excluded those with pregnancy or known hepatitis C.
- Participants also underwent reference standard tests (RST, transient elastography) for significant fibrosis or cirrhosis: liver stiffness (LS), LS>7.0 kPa and LS>12.5 kPa, respectively. Reference standard for lesions was abdominal US by an experienced radiographer.
- Nonparametric analysis of ROC curve for PUSH was adjusted for operator type (doctor vs. nurse), sex, and HIV status.

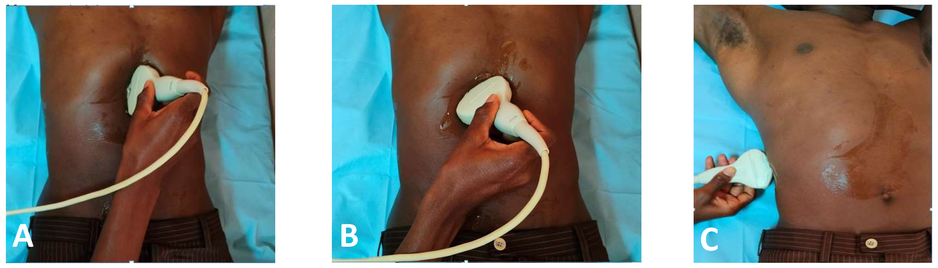


Figure 1. Essential scans in PUSH protocol: A.Epigastric view, B.Subcostal view, C.Trascostal right view.

Front-line doctors and nurses detected *liver lesions* with **high accuracy** and *cirrhosis* with **moderate accuracy** after being trained in the **PUSH** protocol. Sensitivity was **low** for significant *fibrosis.*

RESULTS

202 PTs were involved in the study, including 57 (28%) with HBV/HIV (Table 1). By RSTs, 30% of PTs had significant fibrosis, 12% had cirrhosis (Figure 2), and 4% had liver lesions (Figure 3). In PTs with lesions by PUSH alpha-fetoprotein when available, was ≥350 ng/mL. PUSH had low accuracy in detecting significant fibrosis, with sensitivity of 28.3% (17.5 – 41.4), specificity of 99.3% (96.1 – 100), and an overall ROC area under the curve (ROC-AUC) of 0.64 (0.57 – 0.70), and moderate accuracy for cirrhosis, with sensitivity of 56% (34.9 – 75.6), specificity of 97.7% (94.3 – 99.4), and ROC-AUC of 0.77(0.70 – 0.82). Higher accuracy was obtained for liver lesions, with 85.7% (42.1–99.6) sensitivity, 93.5% (88.9 - 96.6) specificity, ROC-AUC of 0.90 (0.84 - 0.94).



Figure 2. Cirrhosis detected in one study participant.



Figure 3. Liver lesion detected in one study participant.

Table1. Participants characteristics.

	Overall (n=202)	HBV treatment-experienced (n=140)	HBV treatment-naïve (n=62)
Age, years	38.1 (32.2-46.0)	39.4 (33.5-46.7)	34.9 (30.0-43.7)
Sex, male (%)	115 (57)	81 (58)	34 (55)
Years since HBV diagnosis	2.3 (1.4-6.3)	2.4 (1.4-8.3)	1.4 (1.3-2.4)
HIV positive (%)	57 (28)	57 (41)	0
CD4 cells number (cells/mmc)	418 (349-632)	418 (349-632)	NA
ALT levels, U/L	25 (20-33)	23 (18-31)	26 (20-38)
ALT elevation (>30 U/L M; >19 U/L)	78 (51)	58 (53)	20 (45)
missing data	49	31	18
APRI score,	0.33	0.37	0.29
>2 (cirrhosis)	9 (7)	7 (9)	2 (5)
>0.5 (significant fibrosis)	35 (29)	29 (37)	6 (14)
missing data	81	62	18
HBV DNA >2000 IU/mL	35 (33)	26 (32)	9 (36)
missing data	95	58	37

Results described by median (IQR) or frequency (%).
Abbreviations: IQR=interquartile range; NA: not available; ALT: alanine transaminase; M: male; F: female; APRI: Aspartate transaminase to platelet ratio index.

CONCLUSIONS

Newly-trained nurses and physicians in Zambia were able to use PUSH to diagnose cirrhosis with moderate accuracy and liver lesions with high accuracy in people with CHB with and without HIV coinfection.

PUSH could be a useful, inexpensive tool to rapidly assess advanced liver disease and eligibility for HBV treatment in low-income settings where laboratory systems are lacking.

ADDITIONAL KEY INFORMATION

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