Improved HCV case finding and management using enhanced testing of Dried Blood Spots (DBS)

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Background:
Hepatitis C virus (HCV) infection remains a public health burden in Australia, with ~9,000 new infections reported annually. HCV infection disproportionately affects priority populations, including individuals in custodial settings, intravenous drug users and Indigenous Australians. Expanded and equitable access to testing is essential to WHO HCV 2030 elimination targets. Current testing relies on blood collection via venepuncture, encompassing logistical barriers, whilst DBS sampling represents a minimally invasive, operationally feasible alternative. We evaluated analytical and clinical performance of DBS for HCV RNA detection using Roche Cobas® 6800 system and HCV antibody detection using Abbott Alinity i Anti-HCV assay, for TGA validation and licensing.

Methods:
Extensive parallel testing was performed on DBS and EDTA plasma specimens, from 1,286 individuals in NSW custodial settings to assess concordance, effects of virus genetics, sensitivity, specificity, stability, inter and intra-assay precision, cross-reactants, interfering-substances, seroconversion, LoD and reflex algorithms. The 1,286 paired DBS and EDTA specimens included 133 (10.3%) HCV RNA-positive and 1,153 (89.7%) RNA-negative samples.

Results:
Concordance between DBS and EDTA specimens for detection of HCV viraemia was high, with a correlation coefficient of 97.7%. Sensitivity and specificity of Abbott was 99.6%, 100% and Roche 98.2%, 99.7%, respectively. DBS demonstrated excellent stability, minimal degradation across multiple timeframes, dilution fractions, and conditions. Intra- and inter-assay demonstrated highly repeatable and reproducible performance, with Abbott and Roche SD of ≤0.59, ≤1.13 respectively, and non-significant Ct or S/CO variation. No cross-reactivity or interference was observed with endogenous or exogenous substances including antiretrovirals/antivirals, atazanavir, ganciclovir, tenofovir; non-HCV pathogens, heterophile antibodies and vaccinations, HIV, CMV, EBV, measles; and bilirubin, triglyceride, haemoglobin and biotin. Seroconversion and genotyping confirmed adequate window period detection and detection of prevalent Australian genotypes, 1a, 2b, 3a.

Conclusion:
DBS for HCV testing demonstrates robust analytical and clinical performance. DBS is a suitable, reliable, and scalable alternative and expands diagnosis in priority populations.

Disclosure of Interest Statement:
The authors declare that they have no financial or non-financial conflicts of interest related to this work.