

Textual analysis of clinical notes on pathology request forms to determine sensitivity and specificity of Hepatitis B and C virus infection status

Eric H. Kim¹, Brett A. Lidbury^{1,2}, Alice M. Richardson^{1,2}

¹National Centre for Epidemiology and Population Health, Australian National University, Canberra ACT 2601, Australia
²Statistical Consulting Unit, Australian National University, Canberra ACT 2601, Australia

Introduction

Background: It is not established whether free-entry clinical notes that accompany pathology request forms are a good predictor for outcome of Hepatitis B and C viral infection status.

Objective: To explore predictive power of clinical notes, the sensitivity and specificity of clinical notes were determined for outcome of Hepatitis B and C infection, using serology as gold standards.

Methods

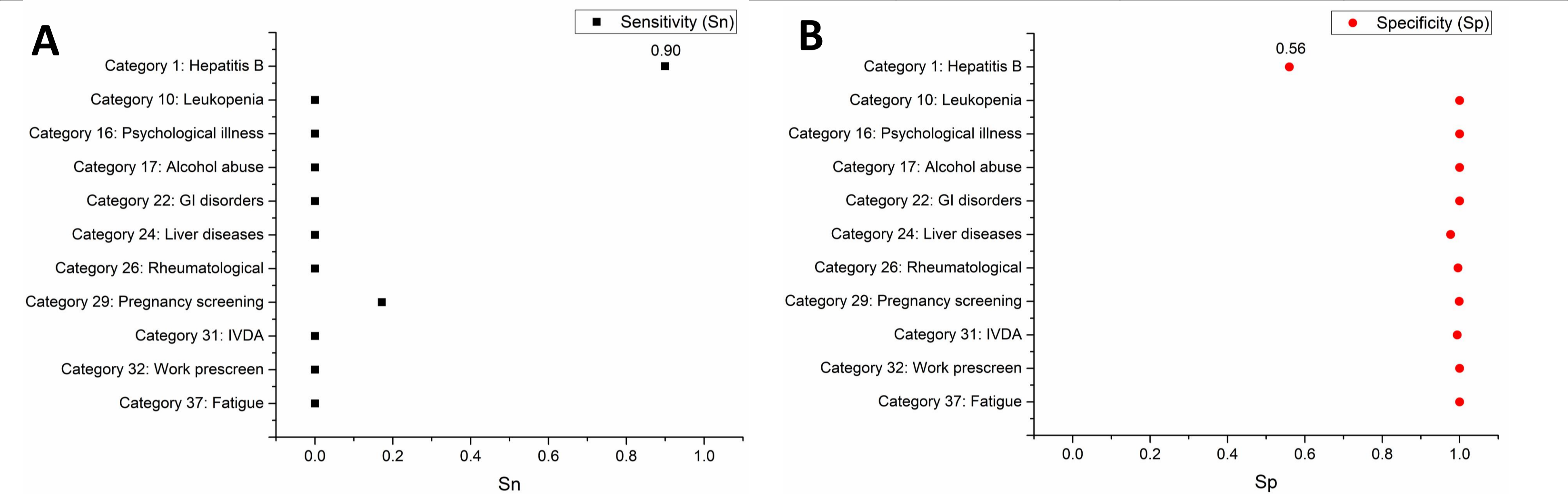
Methods: The study comprises 179 cases and 166 cases tested for HBsAg and anti-HCV serological markers, respectively, and accompanied by a written description (clinical note) provided on pathology request forms by the clinician on duty. The clinical note sensitivity, specificity, positive (PPV) and negative (NPV) predictive values were calculated using serological HBsAg and anti-HCV tests as gold standards.

Data set: A retrospective analysis was performed on 345 individuals tested for hepatitis virus from data collected between 1997-2007. The data was provided by ACT Pathology, The Canberra Hospital (TCH).

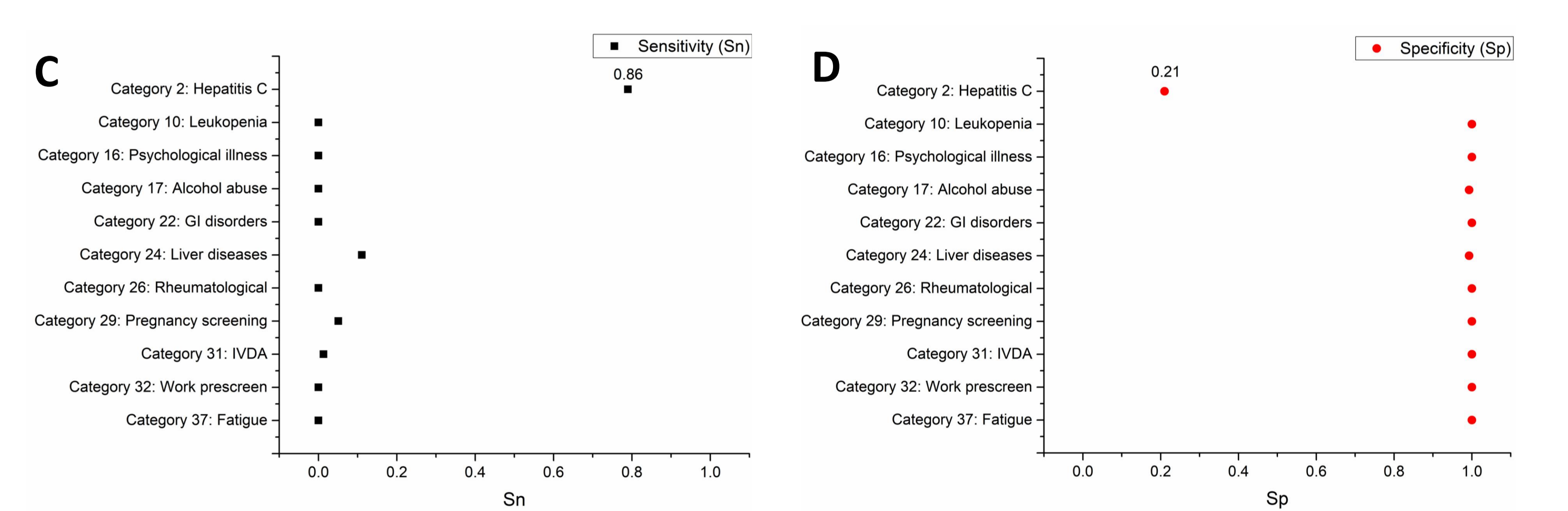
Clinical notes: The clinical note on pathology test request forms is a section typically containing clinical information about the patient, and a description of possible diagnosis prior to the outcome of pathological tests, reported in free-text entry. When a “statement” is made on the written note, such as “Hep”, “Known Hep”, “Hep Pos”, “Hx Hep”, “Hep exposure”, it was considered a positive infection status, whereas a written note with a “query” or non-specific data entry was considered a negative infection status.

Control notes: We have investigated sensitivity and specificity in further ten clinical notes, which were selected to serve as controls. Selection was based on adequate number of cases available in each category, available hepatitis virology data, and a mix number of categories to represent varying disease states that may or may not affect risk of hepatitis infection.

Clinical note	Sn (%) (95% CI)	Sp (%)	PPV (%)	NPV (%)	LR+	LR-
Hep B	90 (80.6-95.4)	56 (45.7-65.7)	61 (54.9-65.9)	87 (78.3-93.4)	2.05 (1.61-2.56)	0.18 (0.09-0.37)
Hep C	86 (77.9-91.4)	21 (10.5-35.0)	73 (69.3-75.8)	37 (22.5-54.4)	1.08 (0.92-1.27)	0.67 (0.34-1.40)



A-B: Clinical note Hepatitis B analysis. (A) Sensitivity and (B) Specificity of Hepatitis B infection status (Sn and Sp, 0.90 and 0.56, respectively), compared to low sensitivity (<0.17) and high specificity (>0.98) detected across all other clinical notes.



C-D: Clinical note Hepatitis C analysis. (A) Sensitivity and (B) Specificity of Hepatitis C infection status (Sn and Sp, 0.86 and 0.21, respectively), compared to low sensitivity (<0.11) and high specificity (>0.99) detected across all other clinical notes.

Results

Clinical notes for Hepatitis B and C:

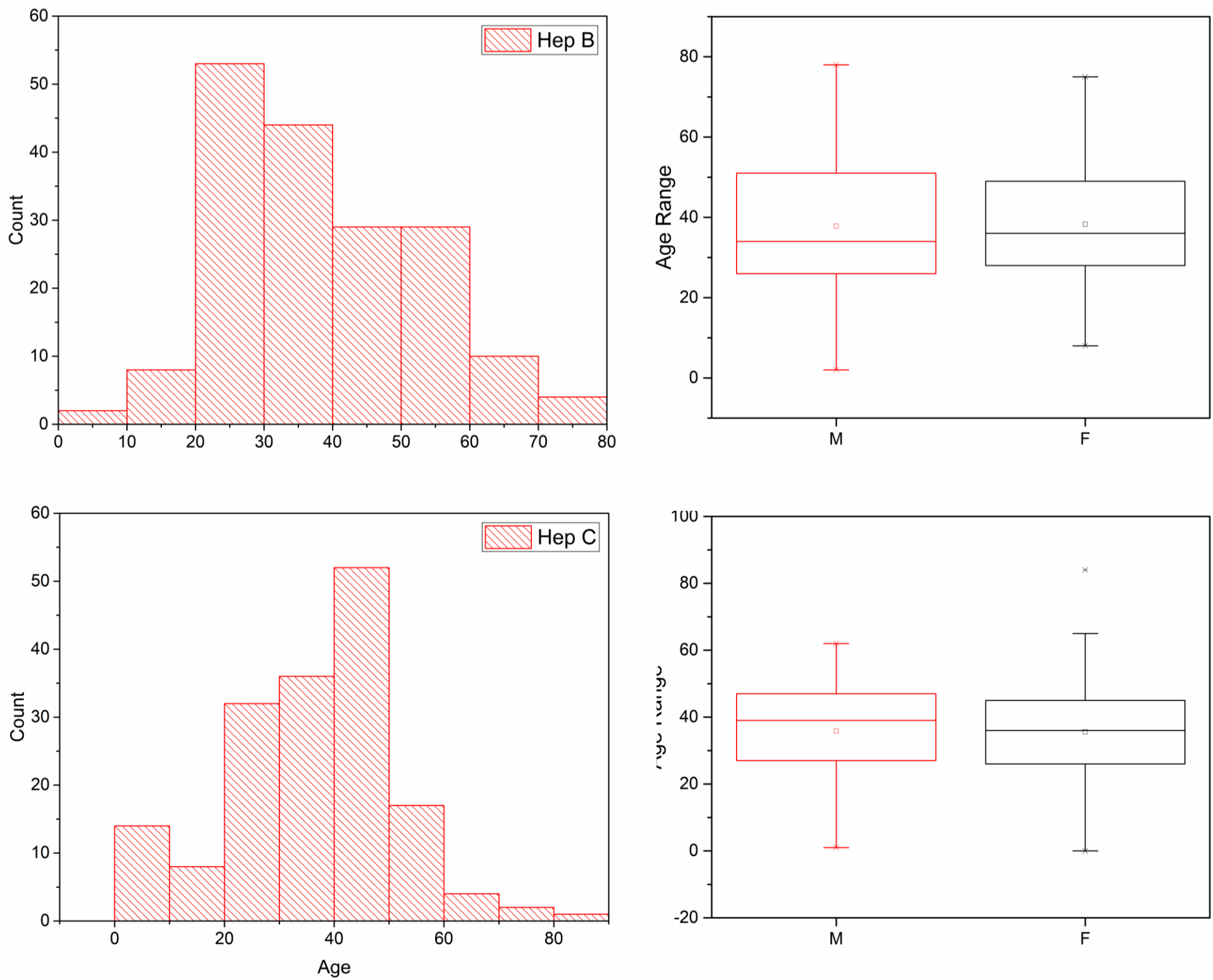
- The sensitivity of clinical notes for both Hepatitis B and C status show moderate-to-high values (90% and 86%, respectively), which suggests that written clinical notes provided at the time of pathology request display solid accuracy based on clinical history and individual clinician judgement for the diagnosis of HBV and HCV infection status.
- The calculated specificity for both clinical notes, however, show low values (56% and 21%, respectively), which suggest weak performance for identifying HBV and HCV infection outcomes, and incorrectly identifying patients who do not have the condition.

Diagnostic predictability of Hepatitis B and C in Control notes:

- In terms of assessing Hep B status, the sensitivity and specificity in ten control notes showed low sensitivity (<0.17) and high specificity (>0.98) across all ten categories.
- For assessment of Hep C status, low sensitivity (<0.11) and high specificity (>0.99) was observed across all control notes.
- Overall, this suggests Hep B and C infection status is poorly identified in control clinical notes (low Sn), however, high Sp was obtained, suggesting its utility for detecting a true negative infection state. Clinical note does not discriminate the status of Hep B or C infection based on its prior health risk.

Conclusion

Conclusions: Clinical note information identifies moderate-to-high sensitivity with regards to Hepatitis B and C viral infection status, however, given low specificity in both groups, the clinical note is not favourable for ruling disease “in”. This preliminary findings suggest that clinical notes are at best moderately useful in the identification of patients with Hepatitis infection (moderate sensitivity), however not useful to be employed as a sole source of diagnosis of Hepatitis infection status (low specificity), and require further information and confirmation with other tests.



	Clinical note: Hep B	Clinical note: Hep C
N	179	166
Age (mean years ± S.D.)	38 ± 14.4	36 ± 15.8
Sex	M:F (98:81)	M:F (85:81)

Demographics of study. Number of subjects (N), age and sex distribution in the clinical note Hepatitis B group (N=179), and Hepatitis C group (N=166)