A threshold analysis for the cost-effectiveness of hepatitis B and C testing in emergency departments in the UK

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Background

The prevalence of blood borne viruses (BBVs) is higher in emergency department (ED) attendees compared to the general population, due to higher attendance of marginalised populations.

Studies have suggested a prevalence of up to 2% and 2.9% for hepatitis B (HBV) and hepatitis C (HCV) in EDs in England, although this varies considerably across regions.[1]

HIV testing in EDs in the UK is recommended in high prevalence areas (prevalence of 0.2% or higher), but there is no defined threshold for hepatitis testing.

Hepatitis testing for those already receiving blood tests in EDs, could provide an efficient setting to diagnose and treat those living with undiagnosed hepatitis.

Methods

A Markov model was developed to analyse the impact of opt-out hepatitis C (HCV) and hepatitis B (HBV) testing in EDs in the UK.

The model used data from studies of ED testing in the UK to parameterise test costs and intervention effects (Table 1). Utilities, health state costs and transition probabilities were derived from the literature

We considered what prevalence of HCV (RNA-positive) and HBV (HBsAg) would be required to make ED testing cost-effective at an incremental cost-effectiveness ratio (ICER) threshold of £20,000 willingness to pay per quality adjusted life year (QALY) gained.

We also performed threshold analyses, considering the prevalence required for the intervention to be cost-effective across various test costs and intervention effects.

Table 1: Key model parameters

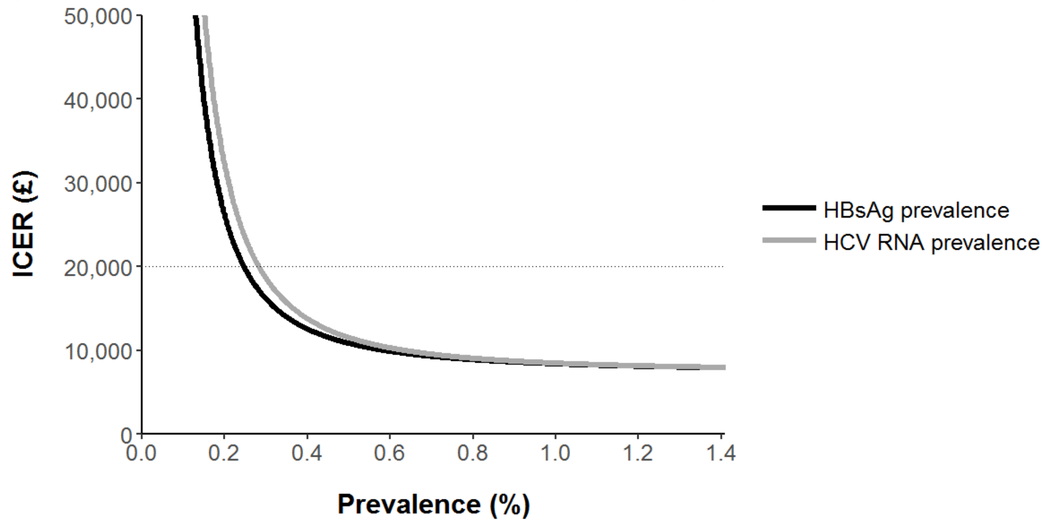
HBV parameters	Value	Source
Proportion of positive patients successfully contacted	64.7%	Parry[2], Evans[3]
Proportion requiring linkage to care*	52.4%	Parry[2], Evans[3]
Proportion attending referral and accepting treatment	77.4%	Parry[2], Evans[3]
HBV antigen test (and reflex confirmation if HBsAg+)	£5.79	Guys St Thomas Trust[4]
Annual Peg-IFN / TDF costs	£3672 / £578	British National Formulary
Cost per contact individual	£10.30	Parry[2] / PSSRU[5]
HCV parameters	**Value**	**Source**
Proportion of positive patients successfully contacted	61.8%	Parry[2], Evans[3]
Proportion requiring linkage to care*	49.5%	Parry[2], Evans[3]
Proportion attending referral and accepting treatment	53.2%	Parry[2], Evans[3]
HCV Antibody test cost	£3.51	Bradshaw[6]
HCV RNA test cost	£68.38	Bradshaw[6]
DAA treatment	£10,000	Assumption / Hurley[7]
Cost to contact individual	£15.85	Parry[2] / PSSRU[5]

* New diagnoses, or known diagnoses not engaged in care

Results

Testing was cost-effective at a HBsAg prevalence of **0.25%** or higher, and at a HCV RNA prevalence of **0.3%** or higher (Figure 1).

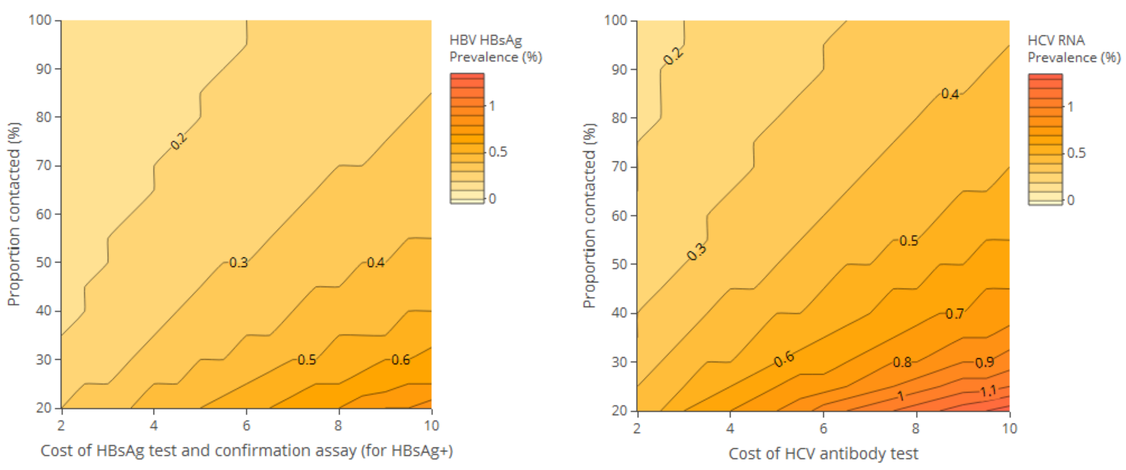
Figure 1: Incremental cost-effectiveness ratio (ICER) for testing by prevalence



Our threshold prevalence estimates are highly sensitive to the cost of the test, and the effectiveness of the intervention, i.e. the proportion of patients successfully contacted (Figure 2).

The results were also sensitive to the cost of treatment, the proportion of individuals that required linkage to care, and the proportion of individuals accepting treatment (post referral).

Figure 2: Threshold analysis for prevalence required for cost-effectiveness by intervention effectiveness (proportion of patients successfully contacted) and cost of test



Limitations

Intervention effects and linkage to care estimates are based on two London ED studies only, both with their own limitations.

Many testing pathways for HBV and HCV exist across UK EDs

The model did not consider transmission, meaning benefits associated with reduced onward transmission are not captured.

Conclusions

Early evidence suggests that ED testing based linkage to care for HBV and HCV is likely to be cost-effective in many UK ED's.

Additional studies are required to evaluate ED testing across regions, using epidemiological, linkage to care and cost data specific to each region. This can help provide estimates to inform public health guidelines in the UK.

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