LinkB: A New Approach for Identification and Linkage to Care for People Living with Chronic Hepatitis B

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Worldwide status of hepatitis B infection

Hepatitis B Virus (HBV)

- 296 million people living with hepatitis B
- HBsAg-positive prevalence of 3.9%

820,000 deaths from HBV-related causes

Fibrosis  Cirrhosis  Hepatocellular carcinoma

HBV infection remains related with a high health and economic burden

Hepatitis B without linkage to care

Mainly asymptomatic
90% undiagnosed worldwide

Individuals living with Hepatitis B not linked to care

Cannot receive treatment

Do not allow the WHO goals by 2030

LinkB: No hepatitis B without linkage to care

Individuals living with Hepatitis B linked to care → Can receive treatment

WHO goals by 2030

LinkB study

Aims of LinkB study

• To promote the linkage to the specialist of people with Hepatitis B

• To determine the barriers of linkage to the specialist

• To characterize HBsAg-positive individuals not linked to the specialist
Study design and methods

- Unicentric University Hospital (Barcelona, Spain)
- Retrospective-prospective
  - Hepatitis B surface antigen (HBsAg)
- Microbiologist Department

- Reference laboratory of Barcelona city
- Catchment population of 450,000 inhabitants
- 15 Primary Care Centres + Care and follow-up centres for drug addictions
Study design and methods

**Baseline data exportation**
- Age, Sex
- Soliciting centre
- AST/ALT
- Hepatotropic virus
- HIV

**Revision of medical records**
- Linkage status
- Reasons not linked

**Classification of HBV infection + Antiviral treatment**

<table>
<thead>
<tr>
<th>Haematological profile</th>
<th>HBV biomarkers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Platelet count</td>
<td>HBsAg/Anti-HBs</td>
</tr>
<tr>
<td>Prothrombin time</td>
<td>HBeAg/Anti-HBe</td>
</tr>
<tr>
<td>INR</td>
<td>HBV DNA</td>
</tr>
<tr>
<td>Biochemical profile</td>
<td>HBCrAg/Anti-HBc</td>
</tr>
<tr>
<td>Bilirubin</td>
<td>Anti-HDV</td>
</tr>
<tr>
<td>Creatinine</td>
<td>Anti-HCV</td>
</tr>
<tr>
<td>AST/ALT</td>
<td>HIV</td>
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<tr>
<td>Albumin</td>
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<tr>
<td>FIB-4 score</td>
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<tr>
<td>APRI</td>
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<tr>
<td>Transient elastography</td>
<td></td>
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<tr>
<td>Abdominal ultrasounds</td>
<td></td>
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</tbody>
</table>

**Linkage to the hepatologist**
- Blood test and fibrosis assessment
- Visit with the hepatologist

**Clinical and demographic data collection**

- Died
- HBsAg clearance

**Contact with candidates**
1. Phone (min 2x/number)
2. Letter (all addresses)
3. Email
4. Phone message

Flowchart of HBsAg-positive cases (N=2,657)
Preliminary results until May 2022

2,657 HBsAg-positive cases

 Linked to the specialist
 n=1,711 (64.4%)

 Not linked to the specialist
 n=946 (35.6%)

 Candidates referred to the hepatologist
 n=593 (62.7%)

 Did not attend the appointment
 n=239 (40.3%)

 Appointment scheduled
 n=69 (11.6%)

 Visited by the hepatologist
 n=285 (48.1%)

Not eligible to be linked
 n=353 (37.3%)
Reasons for not being linked to the specialist (N=946)
Preliminary results until May 2022

- Individuals not linked to the specialist: n=946 (100%)
  - Not referred by the Primary Care Physician: n=285 (30.1%)
  - Patient did not attend the visit / Couldn't be contacted: n=223 (23.6%)
  - Programation matters: n=156 (16.5%)
  - Moved to another region: n=107 (11.3%)
  - Death: n=93 (9.8%)
  - Referred to the Primary Care Physician: n=30 (3.2%)
  - HBsAg clearance: n=28 (3.0%)
  - Unknown reason: n=24 (2.5%)

Non referral by the PCP and non attendance to the visits were the main reasons for not being linked to the specialist.
Differences between people linked to the specialist (N=1,711) and those not (N=946)

Preliminary results until May 2022

2,657 HBsAg-positive cases

Linked to the specialist
n=1,711 (64.4%)

Not linked to the specialist
n=946 (35.6%)
Differences between people linked to the specialist (N=1,711) and those not (N=946)

Preliminary results until May 2022

<table>
<thead>
<tr>
<th>Clinical characteristics</th>
<th>Linked (N=1,711)</th>
<th>Not linked (N= 946)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>49.1 (37.5-60.1)</td>
<td>44.7 (34.3-59.1)</td>
<td>0.000</td>
</tr>
<tr>
<td>Male sex</td>
<td>1,050 (61.4%)</td>
<td>625 (66.1%)</td>
<td>0.009</td>
</tr>
<tr>
<td>Platelet count (x10E9/L)</td>
<td>228.0±69.5</td>
<td>237.1±76.5</td>
<td>0.003</td>
</tr>
<tr>
<td>AST (IU/mL)</td>
<td>27.0 (22.0-35.0)</td>
<td>26.0 (21.8-35.3)</td>
<td>0.905</td>
</tr>
<tr>
<td>Elevated AST</td>
<td>194 (13.9%)</td>
<td>93 (14.2%)</td>
<td>0.437</td>
</tr>
<tr>
<td>ALT (IU/mL)</td>
<td>25.0 (18.0-37.0)</td>
<td>26.0 (17.0-37.0)</td>
<td>0.538</td>
</tr>
<tr>
<td>Elevated ALT</td>
<td>272 (17.1%)</td>
<td>136 (15.9%)</td>
<td>0.234</td>
</tr>
<tr>
<td>HBV DNA (logIU/mL)</td>
<td>2.2 (1.2-3.2)</td>
<td>2.4 (1.3-3.3)</td>
<td>0.015</td>
</tr>
<tr>
<td>HBsAg (logIU/mL)</td>
<td>3.2 (2.4-3.9)</td>
<td>2.8 (1.3-3.6)</td>
<td>0.000</td>
</tr>
<tr>
<td>HBeAg+</td>
<td>164 (12.4%)</td>
<td>56 (7.3%)</td>
<td>0.000</td>
</tr>
<tr>
<td>anti-HCV+</td>
<td>45 (4.5%)</td>
<td>22 (3.0%)</td>
<td>0.071</td>
</tr>
<tr>
<td>anti-HDV+</td>
<td>59 (12.5%)</td>
<td>8 (4.5%)</td>
<td>0.001</td>
</tr>
<tr>
<td>anti-HIV+</td>
<td>17 (2.5%)</td>
<td>4 (0.8%)</td>
<td>0.023</td>
</tr>
</tbody>
</table>

Results are expressed in Md (IQR), n (%), Mean±SD.
Characteristics of individuals who were visited (N=285) and those who did not attend (N=239) 
Preliminary results until May 2022

- 2,657 HBsAg-positive cases
- Linked to the specialist:
  - n=1,711 (64.4%)
- Not linked to the specialist:
  - n=946 (35.6%)
  - Candidates referred to the hepatologist:
    - n=593 (62.7%)
      - Did not attend the appointment:
        - n=239 (40.3%)
      - Appointment scheduled:
        - n=69 (11.6%)
      - Visited by the hepatologist:
        - n=285 (48.1%)
## Characteristics of individuals who were visited (N=285) and those who did not attend (N=239)

Preliminary results until May 2022

### Clinical and demographic characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Visited (N=285)</th>
<th>Did not attend (N=239)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ethnia</strong></td>
<td></td>
<td></td>
<td>0.000</td>
</tr>
<tr>
<td>Caucasian</td>
<td>104 (39.4%)</td>
<td>42 (28.2%)</td>
<td></td>
</tr>
<tr>
<td>African</td>
<td>47 (17.8%)</td>
<td>61 (40.9%)</td>
<td></td>
</tr>
<tr>
<td>Middle East</td>
<td>36 (13.6%)</td>
<td>27 (18.1%)</td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>61 (23.1%)</td>
<td>13 (8.7%)</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>16 (6.1%)</td>
<td>6 (4.0%)</td>
<td></td>
</tr>
<tr>
<td><strong>Age (years)</strong></td>
<td>45.9 (36.0-57.5)</td>
<td>40.2 (32.5-48.6)</td>
<td>0.000</td>
</tr>
<tr>
<td><strong>Male sex</strong></td>
<td>161 (56.5%)</td>
<td>169 (70.7%)</td>
<td>0.001</td>
</tr>
<tr>
<td><strong>Platelet count (x10E9/L)</strong></td>
<td>240.1±61.2</td>
<td>239.1±58.8</td>
<td>0.847</td>
</tr>
<tr>
<td><strong>AST (IU/mL)</strong></td>
<td>26.0 (21.0-34.0)</td>
<td>26.0 (22.0-32.0)</td>
<td>0.951</td>
</tr>
<tr>
<td><strong>Subjects with increased AST</strong></td>
<td>27 (13.2%)</td>
<td>9 (5.8%)</td>
<td>0.014</td>
</tr>
<tr>
<td><strong>ALT (IU/mL)</strong></td>
<td>25.0 (17.0-37.0)</td>
<td>24.0 (17.0-33.0)</td>
<td>0.315</td>
</tr>
<tr>
<td><strong>Subjects with increased ALT</strong></td>
<td>38 (14.6%)</td>
<td>18 (8.1%)</td>
<td>0.019</td>
</tr>
<tr>
<td><strong>HBV DNA (logIU/mL)</strong></td>
<td>2.6±1.5</td>
<td>2.5±1.4</td>
<td>0.417</td>
</tr>
<tr>
<td><strong>HBsAg (logIU/mL)</strong></td>
<td>2.8±1.3</td>
<td>2.9±1.1</td>
<td>0.632</td>
</tr>
<tr>
<td><strong>HBeAg+</strong></td>
<td>12 (5.1%)</td>
<td>8 (4.0%)</td>
<td>0.382</td>
</tr>
<tr>
<td><strong>anti-HCV+</strong></td>
<td>5 (2.3%)</td>
<td>9 (4.7%)</td>
<td>0.143</td>
</tr>
<tr>
<td><strong>anti-HDV+</strong></td>
<td>4 (6.9%)</td>
<td>1 (2.6%)</td>
<td>0.328</td>
</tr>
</tbody>
</table>

Results are expressed in Md (IQR), n (%), Mean±SD.
Conclusions

1. More than one-third of recorded HBsAg-positive cases were not linked to the specialist.

2. The main reasons for no linkage to care were non-referral by the Primary Care Physician and non-attendance of patients to the visits.

3. Individuals not able to be linked were mainly middle-aged African male.

4. LinkB is retrieving more than one third of HBsAg-positive individuals that were not linked.
Thank you for your attention

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