Hepatitis C – From Discovery to Elimination in 40 years

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Consultant Hepatologist and Reader in Hepatology
St George’s Hospital, London
27 year old woman

1 week history of:
Anorexia, nausea, diarrhoea, fever, abdominal pain

PMH:
CKD and dialysis x 2 week
20u blood transfusions over preceding 6 months

SGOT (serum glutamic-oxaloacetic transaminase) 250
SGPT (serum glutamic-pyruvic transaminase) 440
Three further cases on dialysis unit (52, 55, 57 days later)

<table>
<thead>
<tr>
<th>Sex</th>
<th>Age</th>
<th>SGOT</th>
<th>SGPT</th>
<th>Units blood</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>25</td>
<td>1600</td>
<td>1700</td>
<td>14</td>
</tr>
<tr>
<td>M</td>
<td>33</td>
<td>1600</td>
<td>&gt;2000</td>
<td>11</td>
</tr>
<tr>
<td>F</td>
<td>23</td>
<td>14</td>
<td>148</td>
<td>15</td>
</tr>
</tbody>
</table>

- Case 1 was ill for 1 week before a diagnosis was made. During this time she and the patients in cases 2, 3, 4 had been in the habit, while being dialysed, of playing Scrabble, a game that involves the passing of a board and counters among the patients.
- The remaining patient who dialysed on the same nights did not join in the game and did not develop hepatitis.
Hepatitis in a Maintenance Hemodialysis Unit

JOHN B. EASTWOOD, M.B., JOHN R. CURTIS, M.B., ANTHONY J. WING, B.M.,
and HUGH E. DE WARDENER, M.D., F.R.C.P.

London, England

Summary

Fourteen of 27 patients being treated with maintenance hemodialysis and 1 staff nurse from the general wards developed hepatitis between August 1966 and April 1967; 1 patient died. Eight of the attacks were anicteric and three of these, asymptomatic. No cases occurred among the nurses, technicians, and doctors of the Maintenance Haemodialysis Unit.

Gamma globulin modified the disease in the patients and may have prevented it altogether in the staff. The epidemiology of the outbreak and the apparent efficacy of gamma globulin suggest that the epidemic may have been due to infectious hepatitis.

Hepatitis may develop in both patients and staff of centers in which maintenance hemodialysis is performed. Up to 1966, there had been reported to the European Dialysis and Transplant Association 40 cases in about 480 patients undergoing hemodialysis in 65 units; there were 9 deaths (1). Among the staff of these units there were 64 cases of hepatitis with 3 deaths. In his report, Kerr (1) points out that the incidence of hepatitis in these groups is higher than would be expected in an unscreened hospital population of the same size.

Particularly severe outbreaks have occurred in Manchester (2), Liverpool (3), and Brooklyn (4). Some dialysis units have been unable to expand as a result of hepatitis (1). It would seem important, therefore, that the details of each epidemic be made known. We report here an outbreak of hepatitis in the Maintenance Haemodialysis Unit, Fulham Hospital, London.

Dialysis Techniques

Dialysis is carried out on 6 nights a week, and each patient is dialyzed twice weekly on the same nights for a total of 28 to 32 hr weekly. The patients are therefore dialyzed in three groups with little contact between each group. A single-pass warm dialysis system using modified two-layer Kiln dialyzers is used (5). After each dialysis the polypropylene boards of the dialyzers are washed in Hacemosol® (McNeice & Co., Inc.), rinsed in tap water, and then reassembled with new cuprophan (PT 150) membranes. The membranes are prepared by soaking in a pan containing 3% acetic acid in pyrogen-free water. Both the blood and dialysate compartments of the dialyzers are filled with 2% formalin (0.8% formaldehyde) in pyrogen-free water and left for at least 2 hr. Immediately before the next dialysis the formalin is drained off, and the dialysate compartment is washed through with tap water. The blood compartment is washed through with normal saline and then primed with heparinized normal saline. Dialysis fluid is distributed to each bed station from a centralized supply system. In February 1967, batch tank preparation was superseded by a central proportioning system. The supply system and circuit are rinsed with water after each dialysis and then sterilized with 6% formalin (2.4% formaldehyde) for 1 hr. At weekends the formalin remains in the system for 24 hr.

Nurses and technicians wear gloves when dismantling, sterilizing, and reassembling dialyzers and when handling equipment that has been in contact with patient’s blood.

Transfusions

Up to October 1966, blood transfusions amounted to 2.6 units per patient month.

Received January 2, 1968; revision accepted March 20, 1968.

From the Department of Medicine, Charing Cross Hospital Medical School, Fulham Hospital, London, Eng.

Requests for reprints should be addressed to John B. Eastwood, M.B., Department of Medicine, Charing Cross Hospital Medical School, Fulham Hospital, London W. 6, Eng.
16 cases in total, 8 icteric, 8 anicteric
1 death – bronchial wall bleeding, liver was small, yellow and haemorrhagic with massive necrosis and heavy round cell infiltration of the portal tracts
Average incubation period was 55 days (range 42-71)
After case 1:

1. Certain modifications on nursing technique were made.
2. Gloves were worn by nurses during putting-on and taking-off procedures
3. Disposible cups, plates and cutlery were introduced
4. There was segregation of patients and staff for toilet arrangements
5. However meals continued to be taken in the unit by both patients and staff alike as there was no practicable alternative
Particularly severe outbreaks have occurred in Manchester (2), Liverpool (3), and Brooklyn (4). Some dialysis units have been unable to expand as a result of hepatitis (1). It would seem important, therefore, that the details of each epidemic be made known. We report here an outbreak of hepatitis in the Maintenance Haemodialysis Unit, Fulham Hospital, London.

**Dialysis Techniques**

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**Transfusions**

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1989 HCV identified by isolation of a cDNA clone from NANB serum
HCV Burden and Global GT Distribution

Around 9 million people in Europe are chronically infected with HCV

HCV is a Progressive Disease with Serious Sequelae

- HCV is a progressive disease
- Rate of progression is highly variable

Acute infection → Chronic infection 75–85% → Cirrhosis 10–20% over 20 years → HCC 1–4% per year → Decompensated cirrhosis 5-year survival rate 50%

Extrahepatic manifestations

Clearance of HCV RNA 15–25%

Risk of decompensation increases from 5% (1 year) to 30% (10 years) from the diagnosis of cirrhosis

A. Cumulative mortality from all causes of death

Hazard ratio (HR) for mortality after 16.2 years of follow-up was 1.89 (1.66–2.15) for all causes.

B. Cumulative mortality from liver disease

HR for hepatic death was 12.48 (9.34–16.66), and

C. Cumulative mortality from extrahepatic causes

HR for extrahepatic deaths was 1.35 (1.15–1.59).

1992  IFN-α licensed for treatment of HCV
Outcomes were poor – 6% (24 weeks), 13-19% (48 weeks)
Progress was made by adding Ribavirin, and pegylation of interferon:

Direct-Acting Antivirals for the Treatment of Hepatitis C Infection

**NS5A inhibitor**
- Ombitasvir (OBV)*
- Ledipasvir (LDV)†
- Daclatasvir (DCV)
- Elbasvir (EBR)‡
- Pibrentasir (PIB)§
- Velpatasvir (VEL)ǁ

**NS5B polymerase inhibitor**
- Sofosbuvir (SOF)†ǁ
- Dasabuvir (DSV)*

**NS3/4A protease inhibitors**
- Paritaprevir (PTV)*
- Simeprevir (SMV)
- Grazoprevir (GZR)‡
- Glecaprevir (GLE)§
- Voxilaprevir (VOX)§

* OBV/PTV/r co-formulated (Viekirax), DSV (Exviera); † LDV/SOF co-formulated (Harvoni); ‡ EBR/GZR co-formulated; ǁ SOF/VEL co-formulated; § Investigational treatments
Gilead
$1,000
per pill
shame!
The Evolution of HCV Therapy

Frequent curability of diverse populations without IFN

Telaprevir and Boceprevir (GT1)

Curability of HCV without IFN

Simeprevir or Sofosbuvir with IFN (GT1)

First approved IFN-free therapy: Sofosbuvir + RBV (GT2,3)

Simeprevir + Sofosbuvir (GT1)

Ombitasvir/Paritaprevir/RTV (GT4) + Dasabuvir (GT1)

Daclatasvir + Sofosbuvir (GT3) (2016: GT1)

Sofosbuvir/Velpatasvir (all genotypes)

Newly developed therapies

Ledipasvir/Sofosbuvir (GT1)

Daclatasvir + Sofosbuvir (Europe)

Grazoprevir/Elbasvir (GT1,4)

Glecaprevir/Pibrentasvir (all genotypes)

Sofosbuvir/Velpatasvir/Voxilaprevir (DAA failures, all genotypes)

2011
2012
2013
2014
2015
2016
2017

Interferon Era 1991-
HCV-TARGET: Real-World Efficacy and Safety of SOF/VEL for GT1-6 HCV

- Pts treated per local standard of care at academic (n = 45) and community medical centers (n = 19) in North America (n = 60) and Europe (n = 4)
  - N = 451 for SOF/VEL; N = 119 for SOF/VEL + RBV

### SVR12 (%)

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>GT1</th>
<th>GT2</th>
<th>GT3</th>
<th>TN</th>
<th>TE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SOF/VEL</strong></td>
<td>97/239</td>
<td>94/31</td>
<td>98/95</td>
<td>98/97</td>
<td>98/199</td>
<td>90/40</td>
</tr>
<tr>
<td><strong>SOF/VEL + RBV</strong></td>
<td>92/67</td>
<td>88/16</td>
<td>10/13</td>
<td>91/34</td>
<td>97/31</td>
<td>89/36</td>
</tr>
</tbody>
</table>

ENDURANCE-1, -2, -4 Studies: Efficacy of GLE/PIB for Treating GT1, 2, 4, 5, 6 HCV

1 case of on-treatment virologic failure at Day 29 in pt with GT1a HCV infection


**ITT-PS analysis:** included all pts receiving ≥ 1 dose of study drug; excluded pts with HIV coinfection or SOF experience.

**ITT analysis:** excluded pts with SOF experience. **ITT analysis.**
SURVEYOR-II, Part 3: SVR12 Rates With GLE/PIB for Pts With GT3 HCV ± Cirrhosis

Mortality Reduction Achieved by HCV Cure

Survival in ERCHIVES Veterans (N = 13,940*)†[1]

- PrOD
- LDV/SOF
- Untreated

DAA-induced SVR is associated with a 43% reduction in mortality

19% to 30% with cirrhosis

Mos
0 5 10 15 20

Proportion Surviving
0.80 0.82 0.84 0.86 0.88 0.90 0.92 0.94 0.96 0.98 1.00

HCC Risk in DAA-Treated Veterans (n = 25,424‡)[2]

- Cirrhosis with no SVR
- Cirrhosis with SVR
- No cirrhosis with no SVR
- No cirrhosis with SVR

DAA-induced SVR is associated with a 71% reduction in HCC risk

Yrs After Start of HCV Treatment
0 0.85 0.90 0.95 1.00

Probability Free From HCC Diagnosis
0 1 2

*For 18 mos of follow-up.
†BL cirrhosis: PrOD, 24.9%; LDV/SOF, 29.4%; untreated, 19.4%.
‡For 38,204 pt-yrs of follow-up.

In Practice Only a Small Proportion of HCV Patients Receive Treatment - the Cascade of Care

Estimated Global HCV Cascade of Care

Breakdowns in the HCV Care Cascade

High cost of HCV therapy leads to restrictions based on\cite{1,2}:

- Stage of disease
- Medical comorbidities
- Abstinence from drugs and alcohol
- Adherence concerns
- Insurance status

Populations with high HCV prevalence and variable access to healthcare\cite{3}:

- Prisoners
- People living with HCV/HIV coinfection
- Men who have sex with men
- Migrants
- Persons who use drugs

Impact of increasing testing and treatment of hepatitis C

<table>
<thead>
<tr>
<th></th>
<th>Base case</th>
<th>2014</th>
<th>2016</th>
<th>2018</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligibility</td>
<td>60%</td>
<td>60-80%</td>
<td>80%</td>
<td>95%</td>
<td>95%</td>
</tr>
<tr>
<td>Number treated</td>
<td>5430</td>
<td>8150</td>
<td>11,700</td>
<td>14,700</td>
<td>600</td>
</tr>
<tr>
<td>Stage of disease treated</td>
<td>&gt;= F2</td>
<td>&gt;=F1</td>
<td>any</td>
<td>any</td>
<td>any</td>
</tr>
<tr>
<td>Numbers newly diagnosed</td>
<td>5,600</td>
<td>6,700</td>
<td>10,000</td>
<td>15,100</td>
<td>880</td>
</tr>
</tbody>
</table>

Wedemeyer H et al J Viral Hepat. 2014
GLOBAL HEALTH SECTOR STRATEGY ON
VIRAL HEPATITIS
2016–2021
TOWARDS ENDING VIRAL HEPATITIS
Figure 2. Estimated global number of deaths due to viral hepatitis, HIV, malaria and TB, 2000–2015

GLOBAL VISION

A world where viral hepatitis transmission is halted and everyone living with viral hepatitis has access to safe, affordable and effective prevention, care and treatment services.

GOAL

Eliminate viral hepatitis as a major public health threat by 2030.⁸
Figure 6. Targets for reducing new cases of and deaths from chronic viral hepatitis B and C infection.
<table>
<thead>
<tr>
<th>Service coverage targets</th>
<th>2015</th>
<th>2020</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hepatitis B virus vaccination: childhood vaccine coverage (third dose coverage)</td>
<td>82%¹¹ in infants</td>
<td>90%</td>
<td>90%</td>
</tr>
<tr>
<td>Prevention of hepatitis B virus mother-to-child transmission: hepatitis B virus birth-dose vaccination coverage or other approach to prevent mother-to-child transmission</td>
<td>38%</td>
<td>50%</td>
<td>90%</td>
</tr>
<tr>
<td>Blood safety</td>
<td>39 countries do not routinely test all blood donations for transfusion-transmissible infections</td>
<td>95% of donations screened in a quality-assured manner</td>
<td>100% of donations are screened in a quality-assured manner</td>
</tr>
<tr>
<td>Safe injections: percentage of injections administered with safety-engineered devices in and out of health facilities</td>
<td>5%</td>
<td>50%</td>
<td>90%</td>
</tr>
<tr>
<td>Harm reduction: number of sterile needles and syringes provided per person who injects drugs per year</td>
<td>20</td>
<td>200</td>
<td>300</td>
</tr>
<tr>
<td>Viral hepatitis B and C diagnosis</td>
<td>&lt;5% of chronic hepatitis infections diagnosed</td>
<td>30%</td>
<td>90%</td>
</tr>
<tr>
<td>Viral hepatitis B and C treatment</td>
<td>&lt;1% receiving treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 million people will be receiving hepatitis B virus treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 million people have received hepatitis C virus treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Both targets are cumulative by 2020)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>80% of eligible persons with chronic hepatitis B virus infection treated</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>80% of eligible persons with chronic hepatitis C virus infection treated</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ADAPTING SERVICES

PRIORITY ACTIONS FOR COUNTRIES

Define populations and locations that are most affected and require intensified support, and prioritize them in the national hepatitis response while minimizing the risk of stigmatization.

Build community capacity to deliver quality community-based hepatitis services, supported by legal and regulatory frameworks and appropriate financial incentives.

Decentralize and expand hepatitis services to include, where appropriate, services in custodial settings, refugee camps and places of humanitarian concern.

Identify good models of integrated and linked service delivery through operational research, including linkages with other key health areas.

Improve the quality of services by setting national norms and standards for services, integrating quality indicators into strategic information systems and promoting the adoption and implementation of WHO guidelines.

Regularly undertake hepatitis “cascade analyses” for different populations and settings to determine the quality of services, assess service utilization and acceptability, identify major weaknesses and propose possible remedial actions.
The NHS in England has introduced operational delivery networks (ODNs) for HCV treatment.
Operational Delivery Networks (ODNs)
3 phases:

1. 2014 - Early access treatment for patients with decompensated cirrhosis
2. 2015 - Access for patients with cirrhosis
3. 2016 - Treatment for all
Figure 4. Deaths from ESLD* or HCC in those with HCV mentioned on their death certificate in England: 2005 to 2015

* Defined by codes or text entries for ascites, bleeding oesophageal varices, hepato-renal syndrome, hepatic encephalopathy or hepatic failure.
Data source: Office for National Statistics
Figure 3. Number of first registrations and liver transplants undertaken in England where post-hepatitis C cirrhosis was given as either the primary, secondary or tertiary indication for transplant: 2008 to 2015

These figures are based on registry data as at 23 June 2016 and include both elective and super urgent registrations and transplants. Data source: NHS Blood and Transplant UK Transplant Registry.
Total patients treated 16/17

<table>
<thead>
<tr>
<th>Trust</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>GUY'S AND ST THOMAS</td>
<td>12</td>
<td>1</td>
<td>15</td>
<td>6</td>
<td>18</td>
<td>10</td>
<td>7</td>
<td>13</td>
<td>12</td>
<td>14</td>
<td>4</td>
<td>17</td>
<td>129</td>
</tr>
<tr>
<td>KING'S COLLEGE HOSPITAL</td>
<td>23</td>
<td>7</td>
<td>33</td>
<td>36</td>
<td>32</td>
<td>47</td>
<td>45</td>
<td>28</td>
<td>27</td>
<td>39</td>
<td>41</td>
<td>37</td>
<td>395</td>
</tr>
<tr>
<td>LEWISHAM AND GREENWICH</td>
<td>7</td>
<td>4</td>
<td>6</td>
<td>7</td>
<td>14</td>
<td>8</td>
<td>2</td>
<td>9</td>
<td>10</td>
<td>7</td>
<td>8</td>
<td>8</td>
<td>90</td>
</tr>
<tr>
<td>ST GEORGE'S UNIVERSITY HOSPITALS</td>
<td>23</td>
<td>20</td>
<td>23</td>
<td>20</td>
<td>13</td>
<td>31</td>
<td>21</td>
<td>13</td>
<td>11</td>
<td>21</td>
<td>26</td>
<td>34</td>
<td>256</td>
</tr>
<tr>
<td>Grand Total</td>
<td>65</td>
<td>32</td>
<td>77</td>
<td>69</td>
<td>77</td>
<td>96</td>
<td>63</td>
<td>75</td>
<td>60</td>
<td>81</td>
<td>79</td>
<td>96</td>
<td>870</td>
</tr>
</tbody>
</table>

- 91.5% of prescribed run rate – End of year
### Prioritisation of patients

#### Percentage of treatment starts based on severity of liver disease over time

**Aug 15 - Sept 17 - STHEPNET**

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Non-Cirrhotic</th>
<th>Cirrhotic Compensated</th>
<th>Cirrhotic Decompensated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q2 - 15/16 N=40</td>
<td>75.0%</td>
<td>15.00%</td>
<td>4.69%</td>
</tr>
<tr>
<td>Q3 - 15/16 N=128</td>
<td>85.9%</td>
<td>1.88%</td>
<td>3.33%</td>
</tr>
<tr>
<td>Q4 - 15/16 N=213</td>
<td>29.58%</td>
<td>9.33%</td>
<td>61.14%</td>
</tr>
<tr>
<td>Q1 - 16/17 N=180</td>
<td>49.44%</td>
<td>19.44%</td>
<td>31.12%</td>
</tr>
<tr>
<td>Q2 - 16/17 N=241</td>
<td>69.29%</td>
<td>5.39%</td>
<td>25.33%</td>
</tr>
<tr>
<td>Q3 - 16/17 N=200</td>
<td>76.50%</td>
<td>4.50%</td>
<td>19.00%</td>
</tr>
<tr>
<td>Q4 - 16/17 N=256</td>
<td>76.56%</td>
<td>1.95%</td>
<td>4.04%</td>
</tr>
<tr>
<td>Q1 - 17/18 N=264</td>
<td>78.31%</td>
<td>3.04%</td>
<td>18.63%</td>
</tr>
<tr>
<td>Q2 - 17/18 N=256</td>
<td>78.33%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
STHepNet 5 year plan

Improving access to Hep C Treatment

• Education of high risk groups and key workers to promote testing and positive messages around treatment.

• Continued diagnostic innovation and provision of rapid-turnaround diagnostics in the community.

• Direct linkage from testing into community-based treatment.

• Provision of increased peer support.

• Appropriate infrastructure to treat the prison population.

• Case finding - HepCare
SWL outreach locations

- Queen Mary’s Hospital, Roehampton - 2013
  - Consultant/CNS
  - Referrals from Kingston, Twickenham, Richmond, Wandsworth drug clinics

- St John’s Therapy Centre, Clapham with Wandsworth CDAS – 2014
  - CNS

- Turning Point Croydon – 2017
  - Consultant/CNS/BBV nurse

- HMP Wandsworth – 2007
  - CNS/BBV nurse

- Nelson Hospital, Merton - 2017
  - CNS
Facilitating Outreach

- Proactive commissioning
- Enthusiastic, proactive drug services (staff, management, clients)
- Enthusiastic, non-judgemental providers
- Continuing education at every level
- Involvement of BBV staff and key workers in case management
- Enabling finance
- Enabling logistics – bloods, Fibroscan, pharmacy
- Novel diagnostics and monitoring – capillary blood
- Client confidence, peer referral
Capillary blood testing

- 100-500 microL
- HBV/HCV/HIV serology and HCV VL/genotype

Opt-out testing at HMP Wandsworth

<table>
<thead>
<tr>
<th>Stage</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total new receptions</td>
<td>428</td>
<td>601</td>
<td>542</td>
<td>449</td>
<td>529</td>
</tr>
<tr>
<td>Number offered test</td>
<td>339</td>
<td>491</td>
<td>392</td>
<td>364</td>
<td>399</td>
</tr>
<tr>
<td>Number tested</td>
<td>158</td>
<td>271</td>
<td>295</td>
<td>323</td>
<td>353</td>
</tr>
<tr>
<td>Number positive for HCV antibody (DBST)</td>
<td>15</td>
<td>18</td>
<td>27</td>
<td>21</td>
<td>19</td>
</tr>
<tr>
<td>Number offered blood test (for confirmation)</td>
<td>10</td>
<td>16</td>
<td>16</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Number RNA positive for HCV</td>
<td>10</td>
<td>13</td>
<td>18</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Total number with previous diagnosis of HCV</td>
<td>6</td>
<td>6</td>
<td>9</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>
HepCARE

- Clinical Management Tool and Database for HBV/HCV
- Linked to SWL Pathology – captures all positive HBV/HCV results (historical and prospective) with “push” of associated pathology results
- Calculates fibrosis scores / uploads Fibroscan data
- Allows tracking of treatment response
- Linked to PHE HCV Registry for seamless upload
- Excellent case – finding tool
HepCARE Data examples

Patients RNA+ in last 5 years
HepCARE Data examples

Patients RNA+ at last result
Patients RNA+ at last result, heatmap weighted to fibroscan (2.5-75Kpa)
NICE guidance for primary care

• Offer testing for hepatitis B and C to adults and children at increased risk of infection, particularly migrants from medium- or high-prevalence countries and people who inject or have injected drugs.

• Offer testing for hepatitis B and C to people who are newly registered with the practice and belong to a group at increased risk of infection.

• Ask newly registered adults if they have ever injected drugs, including image and performance enhancement substances at their first consultation.

• Offer annual testing for hepatitis C to people who test negative for hepatitis C but remain at increased risk of infection.

• Ensure people diagnosed with hepatitis B or C are referred to specialist care.

http://www.nice.org.uk/Guidance/ph43
Conclusions

• Unprecedented rapid progress from discovery to cure
• Paralleled progress in molecular science
• Testament to collaboration between academic research, pharmaceutical industry and clinicians
• We have moved from grappling with a complex problem in an individual to a complex problem in a population
• Unprecedented opportunity to eliminate HCV through treatment
• Achievement of WHO targets is a key global challenge