Hepatitis B (HBV) and C (HCV) virus infections are major public health problems worldwide causing 1.34 million deaths in 2015. Hepatitis infections are often asymptomatic and therefore under treated. The World Health Organization estimates that only 9% of HBV-infected persons and 20% of HCV-infected persons have been diagnosed, with even fewer treated appropriately. It is thought that this is in part because a significant proportion of people who inject drugs (PWID), baby boomers and individuals born in high prevalence countries are unaware they are infected with Hepatitis B or C. Additionally, infections disproportionately affect those without access to primary health care providers and may only access emergency care services. Lack of awareness and access to appropriate care has led to an estimated 40% of HCV diagnoses in Europe being delayed until the chronic sequelae are manifest.

Countries globally are struggling to make people aware of the epidemic and identify individuals before onset of late stage cirrhosis and fibrosis of the liver. With that, the 2016 Global Viral Hepatitis Strategy prioritised the need for innovative testing strategies integrated with rapid and efficient engagement to care pathways in order to eliminate viral hepatitis as a public health threat by 2030 — a goal that is mirrored by the World Health Organization and Public Health UK. Given the burden of HBV/HCV and the goals set out by Public Health England, the National Health Service is seeking to be the first to eliminate Hepatitis C. The VirA&EmiC group is a collaborative care project encompassing Infectious diseases, Virology, Hepatology, Emergency Department physicians, Epidemiologists, Laboratory sciences, Informatics personnel, and Gilead Sciences Ltd targeting unselected populations of patients attending the Emergency Departments (ED) in London as candidates for blood borne viral screening and access to care. Implementation of an opt-out strategy for hepatitis screening in the ED has increased uptake of testing from 0-1% prior to implementation to 70%, increased rates of diagnosis of previously unknown HBV and HCV infections by 26% and 15% respectively, halted disease progression and ultimately reduced terminal stage expenses (40% improvement), saving approximately 33% annually per patient with acute infections.
Despite significant therapeutic advances in the management of Hepatitis C (HCV) and B (HBV), many patients remain untreated, either due to a lack of diagnosis or due to logistical barriers to accessing care.

Lack of early diagnosis and treatment can result in advanced liver disease, which is the third most common cause of premature mortality in the world and specifically in the UK.

Mortality rates from liver disease have increased 400% since 1970 in the UK with Hepatitis C and B viruses as major contributors to disease progression.

Missed or delayed opportunities to manage liver disease in the early stages can lead to liver cirrhosis, hepatocellular carcinoma and death.

Significant clinical and logistical hurdles have reduced the likelihood of hepatitis screening in primary care and/or through blood banks, which has created the necessity for alternate and innovative screening approaches. Introduction of an education and opt-out pathway can effectively reduce the hurdles in accessing timely care for all patients presenting to the emergency department. When HBV and HCV screening is initiated early in the disease process the appropriate treatment options can reduce liver cirrhosis, mortality, and cost on the health care system.

**HYPOTHESIS**

Removing Obstacles to Patient Care

**CURRENT APPROACH – 14 STEPS**

- ED clinician recognizes risk factors for Hepatitis C and initiates assessment for testing requirement
- ED clinician provides adequate information to gain consent from patient to be tested based on risk factors
- Patient understands information and consents to test
- ED physician selects correct Hepatitis C tests from panel of potential requests
- ED physician checks result in most situations after the patient has left the department
- ED physician locates, validates patient contact information and communicates result to patient (very time consuming)
- GP requests repeat serum Hepatitis C viral load
- Patient attends GP surgery or phlebotomy service for Hepatitis C viral load testing
- Lab performs and results Hepatitis C viral load
- GP checks Hepatitis C viral load result
- GP communicates the result to the patient and refers the patient to Hepatitis Service
- Lab notifies linkage team (cross specialty group of Infectious Diseases, ED and Hepatitis team) of all positive hepatitis results
- Correct order set of hepatitis tests (C and B) is included with all other ED blood order sets by default
- ED physician informs patient that Hepatitis C testing is routine component of testing panel, information available on leaflets if required, notes any objection from patient
- ED physician locates valid patient contact information and communicates result to patient
- ED physician selects correct Hepatitis C tests from panel of potential requests
- ED clinician recognizes risk factors for Hepatitis C and initiates assessment for testing requirement
- ED clinician provides adequate information to gain consent from patient to be tested based on risk factors
- Patient understands information and consents to test
- ED physician selects correct Hepatitis C tests from panel of potential requests
- ED physician checks result in most situations after the patient has left the department
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- GP requests repeat serum Hepatitis C viral load
- Patient attends GP surgery or phlebotomy service for Hepatitis C viral load testing
- Lab performs and results Hepatitis C viral load
- GP checks Hepatitis C viral load result
- GP communicates the result to the patient and refers the patient to Hepatitis Service
- Patient attends Hepatitis service (first point at which treating service takes an active role in engaging with patient)
- Patient completes treatment and attends post treatment follow up to confirm cure

**VIRAEMIC APPROACH – 7 STEPS**

- ED physician informs patient that Hepatitis C testing is routine component of testing panel, information available on leaflets if required, notes any objection from patient
- Correct order set of hepatitis tests (C and B) is included with all other ED blood order sets by default
- Lab notifies linkage team (cross specialty group of Infectious Diseases, ED and Hepatitis team) of all positive hepatitis results
- Linkage team focuses resources on identifying Hepatitis C antigen positive patients Hepatitis C antibody positive and antigen negative results are managed as routine notification (letter) to GP
- Linkage team coordinates referral and appointment in Hepatitis Services most suitable for patient
- Linkage team ensures ongoing support, alcohol and drug misuse services involved in this stage to support attendance
- Linkage team supports throughout treatment to last attendance to confirm cure

**PARTNERS**

Virologist and epidemiologists collaborated with ED physicians, laboratory manager and pathologists to change guidelines and develop the new pathway for screening the ED population with a high sensitivity and quick turnaround assay. The partnership of public private group allowed for highly skilled entities from each discipline to weigh in on critical points of the process and optimize it for the unique Urban ED setting which is highly crowded, short on time and resources.

Key enablers for success of this project was involvement of IT connecting patient opt-out selections directly to laboratories and physicians. Additionally, activation of a community follow-up nurse and the linkage to care coordinator enabled a more effective linkage process and improved treatment/follow-up.
**IDENTIFYING UNTREATED HEPATITIS B AND HEPATITIS C VIA OPT-OUT SCREENING PROGRAM IN URBAN ED SETTINGS**

**EXECUTION**

Guidelines outlined below helped broaden the reach of the physicians to detect a high prevalence subpopulation of Hepatitis infections, allowing for earlier detection of disease and quicker linkage to care.

- All individuals attending ED (aged 16 years or above) requiring blood investigations are verbally consented for HIV, HBV and HCV testing
- An electronic blood order set developed with preselected request for HBV surface antigen (HBsAg) and HCV antibodies (including a confirmatory HCV antigen test when positive) for all the blood test requests
- A dedicated linkage to a care coordinator who contacts those with a positive result directly to organise rapid access to clinic
- Linkage to care (LTC) was defined as attending a minimum of one face to face outpatient appointment

**PROOF OF VALUE**

By utilizing the HCV Ag test the team was able to identify the subset of infected population with an active HCV viral infection and focused their resources on these individuals. By targeting this population and linking them to care there is a significant impact (33% reduction of cost) on future stages of cirrhosis and progression of liver disease to more costly and hard to treat stages.

**NOTE:** Numbers summarized from a four-month period from Oct 2016 to Feb 2017.
## SPOTLIGHT ON STAKEHOLDER SUCCESS

<table>
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<tr>
<th><strong>PATIENT</strong></th>
<th><strong>INCREASED PATIENT AWARENESS</strong></th>
<th>70% of patients not previously concerned with HBV/HCV became aware of the risk and were concerned enough to opt in to the screening program.</th>
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| **DIAGNOSIS OF UNKNOWN INFECTIONS** | • Greater than 26% of newly diagnosed HBV patients in the ED department were previously unaware of their disease  
• Greater than 15% of newly diagnosed HCV patients in the ED department were previously unaware of their disease |
| **PERSONALIZED CARE** | Linkage to clinical treatment and care of 95% of HBV and 71% of HCV patients.* |

| **CLINICIAN** | **IMPROVED CLINICIAN SATISFACTION** | “By screening in the ED department we have the satisfaction of caring for people who are underserved and who typically do not receive care till it’s a much later stage of liver disease and almost irreversible.”  
— Laura Hunter, MBChB (Consultant in Emergency Medicine) |
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<td><strong>INCREASED CLINICIAN EFFECTIVENESS</strong></td>
<td>74% of ED physicians at Guy’s and St Thomas’ NHS Trust indicated that the opt-out program was extremely effective with 26% rating it as effective at identifying HCV/HBV and overcoming obstacles to patient care.</td>
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| **HOSPITAL ADMINISTRATION** | **ENHANCED ADMINISTRATION SATISFACTION** | “The ‘HCV Opt Out program’ is being used to inform the national strategy for HCV elimination. As part of our involvement at the forefront of this important project benefitting our local community, the diagnostic advances and expertise that has been developed at GSTT, gives us a great sense of professional reward and pride.”  
— Dr. Nicholas M. Price, FRCP, Ph.D, DTM&H (Director of Infection | Consultant Physician Guy’s and St Thomas’ NHS Foundation Trust) |

| **PAYOR** | **LOWER HEALTHCARE COSTS** | Reduced disease progression with mitigation of terminal stage expenses (40% improvement), saving approximately 33% annually per patient with acute infections.* |

*Requiring care and contactable.

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