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## New Dimensions for Hospital Services and Early Detection of Disease A report from the Lancet Commission into Liver Disease in the UK --Manuscript Draft--

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<b>Abstract:</b>	<p>The report, in addressing the unacceptable high mortality of acute liver admissions to hospital reinforces the necessity for an integrated clinical services. The masterplan described is based on regional, geographically sited liver centres, each linked to four to six surrounding district general hospital (DGHs) - a pattern of care similar to that successfully introduced for stroke services. The plan includes establishment of a Lead and Deputy Lead Clinician in each acute hospital, preferably a hepatologist or gastroenterologist with liver interest who will have prime responsibility for organising care of acute liver admissions on a 24/7 basis. Essential for the plan is greater access to Intensive Care Unit/High Dependency Unit (ITU/HDU) facilities in line with Covid-19 experience and associated reconfiguration of emergency care. The report strongly recommends full implementation of the Alcohol Care Teams (ACT) programme in hospitals and improved working links with the acute medical services. The Commission also endorses recommendations from paediatric liver services to improve overall survival figures by earlier diagnosis of biliary atresia based on stool charting and by better care of impaired cognitive ability and developmental mental health problems.</p> <p>Pilot studies of earlier diagnosis have shown encouraging progress with 5-6% of previously undiagnosed cases of severe fibrosis/cirrhosis identified through use of a portable FibroScan in primary care. Similar approaches to the detection of early asymptomatic disease are described in accounts from the devolved nations and the potential of digital technology in improving the value of clinical consultation and screening programmes in primary care is highlighted.</p> <p>The striking contribution of co-morbid factors to the mortality of Covid-19, particularly obesity and diabetes - with excess alcohol consumption known to be a major factor in obesity reinforces the need for fiscal and other long delayed regulatory measures to reduce prevalence of obesity, including the food sugar levy, as well as the introduction of the Minimum Unit Price (MUP) policy in reducing alcohol consumption. Improving public health, the Commission emphasises, will not only mitigate the severity of further waves of Covid-19 infection but is critical to reducing an unacceptable disease burden from liver disease in the UK.</p>

# **New Dimensions for Hospital Services and Early Detection of Disease**

## **A report from the Lancet Commission into Liver Disease in the UK**

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## **Executive Summary**

The report, in addressing the unacceptable high mortality of acute liver admissions to hospital reinforces the need for integrated clinical services. The masterplan described is based on regional, geographically sited liver centres, each linked to four to six surrounding district general hospital (DGHs) - a pattern of care similar to that successfully introduced for stroke services. The plan includes establishment of a Lead and Deputy Lead Clinician in each acute hospital, preferably a hepatologist or gastroenterologist with liver interest, who will have prime responsibility for organising care of acute liver admissions on a 24/7 basis. Essential for the plan is greater access to Intensive Care Unit/High Dependency Unit (ITU/HDU) facilities in line with Covid-19 experience and associated reconfiguration of emergency care. The report strongly recommends full implementation of the Alcohol Care Teams (ACT) programme in hospitals and improved working links with the acute medical services. The Commission also endorses recommendations from paediatric liver services to improve overall survival figures by earlier diagnosis of biliary atresia based on stool colour chart, and by better care of impaired cognitive ability and developmental mental health problems.

Pilot studies of earlier diagnosis have shown encouraging progress, with 5-6% of previously undiagnosed cases of severe fibrosis/cirrhosis identified through use of a portable FibroScan in primary care. Similar approaches to the detection of early asymptomatic disease are described in accounts from the devolved nations and the potential of digital technology in improving the value of clinical consultation and screening programmes in primary care is highlighted.

The striking contribution of co-morbid factors to the mortality of Covid-19, particularly obesity and diabetes - with excess alcohol consumption known to be a major factor in obesity - reinforces the need for fiscal and other long delayed regulatory measures to reduce prevalence of obesity. These include the food sugar levy, as well as the introduction of the Minimum Unit Price (MUP) policy in reducing alcohol consumption. Improving public health, the Commission emphasises, will not only mitigate the severity of further waves of Covid-19 infection but is critical to reducing an unacceptable disease burden from liver disease in the UK.

## **Introduction**

The remit from the Lancet to the Commission, following its report in November 2019, was to address the continuing high mortality figures for severely sick liver patients admitted to acute hospitals, figures which are seven times higher than those for stroke and eight times higher than for myocardial infarction. The Commission was also asked to examine earlier detection of liver disease through screening of high-risk subjects in primary and community care. The findings on the importance of co-morbidity factors, particularly obesity and diabetes, in the fatal cases of Covid-19 are addressed and demonstrate the need to improve public health before further waves of infection emerge, as well as reduce the current disease burden of liver disease. Reports of the change in the attitude of the Prime Minister towards actively tackling obesity in the UK give some encouragement that the effective measures endorsed by the Commission, which have already been proposed by the Department of Health and Social Care, may be finally adopted.

The masterplan described for the hospital service takes into account the large number of unfilled hepatology consultant posts and the likely reconfiguration of acute hospital services following the Covid-19 experience, with increased ITU capacity left in place for potential outbreaks of Covid-19 and the necessary resilience to maintain other clinical priorities. The role of the Emergency Department (ED) in the triage of sick patients including Covid-19 patients infected requiring admission, is also examined. The further development of Alcohol Care Teams in hospitals, for which there is a commitment in the Westminster Government's long-term plan for the NHS, provides an opportunity for improving the care of patients with Alcohol Related Liver Disease (ARLD) – and also for integrating acute liver services with community care through Assertive Outreach Clinics, to reduce the number of readmissions. New approaches in the section on paediatric liver disease include earlier diagnosis of biliary atresia, and at the other end of that age range, the need for better transitional care arrangements to adult life including expert neuro-developmental care.

Earlier detection of liver disease in community care, when treatment can be more effective, is the subject of a number of new surveys described in the report, with use of portable FibroScan machines commissioned by local Clinical Care Groups (CCGs). Although since 2013 there has been a legal duty that Local Authorities facilitate offering an alcohol risk assessment in primary care(1), a recent analysis of the national dataset has shown that the proportion of people who recall getting advice about safe alcohol consumption is low compared to other elements of the Healthcheck(2) This section in the report also includes reference to use of digital routes in supporting clinical consultations.

Finally, in the report there are progress accounts from Scotland, Wales and Northern Ireland on their respective liver plans.

### **Co-Morbidity of Covid-19 Infection and Improvement of Public Health**

Of the co-morbidities present in 90% of the fatal Covid-19 cases, obesity and type II diabetes were the most frequent. Patients with obesity are 40% more likely to die or deteriorate rapidly when admitted to hospital (3, 4). Diabetes is present in around 28% of fatal cases compared to a background prevalence of 5.9% in England. The latest report from the Intensive Care National Audit and Research Centre (ICNARC) used data up to 21 May 2020 and showed that 7.7% of patients critically ill in intensive care units (ICU) with confirmed Covid-19 were morbidly obese compared with 2.9% of the general population (after adjusting for age and sex). This disparity was also seen when looking at white and non-white patients separately(5). The report also showed a relationship between BMI and death from Covid-19 in patients with a BMI over 30 kg/m<sup>2</sup>. An early study from Beijing(6) reported that progression to severe disease was more likely in those with underlying Non-alcoholic Fatty Liver Disease (NAFLD). Viral shedding was also more prolonged, making these patients more infectious for longer. Other data from China show that the severity of disease increases with a body mass index (BMI) of >23kg/M<sup>2</sup> (7), highlighting the fact that metabolic consequences of weight gain affect ethnic minorities at a lower BMI(8).

In Covid-19 infection, UK data are emerging of the hazards of liver disease, identified as an independent risk factor for mortality in a study of more than 17 million adult NHS patients (fully adjusted RR 1.61 (1.33-1.95) including age, gender and ethnicity). Moreover, moderate/severe liver disease has emerged as a comorbidity along with cardiorespiratory and diabetes mellitus for ITU admission, predicting around a 50% mortality if present(9). Systematic reviews of the global data also showed that patients with severe Covid-19 had higher rates of liver injury (2.20 [1.60-3.02]; p<0.00001) compared with those with non-severe disease(10). These findings strongly reinforce the need to tackle the prevalence of lifestyle factors that have been the subject of numerous Liver Commission and public health reports(11, 12). Obesity and alcohol consumption are recognised as substantial risk factors for many common cancers including breast and colon, as well as for age-related complications including strokes, cardiac events and dementia. Aside from health benefits to the individuals concerned, enhancing population health should increase societal resilience against future waves of Covid-19 infection.

To tackle obesity, changes to urban infrastructure are needed to encourage both walking and cycling, with the benefits of increasing physical activity adding to those of improved diet and calorie restrictions. Proposals in Chapter 2 and 3 of the Government Child Obesity Plan(13), most of which have been stalled at the consultation stage, need to be implemented, with restrictions on promotion and advertising of unhealthy foods extended to adults. Fiscal measures, namely a tax on dietary sugar and saturated fat, need to be put in place to encourage reformulation of products by industry. Bariatric surgery rates are lower in this country than in others, such as France and Sweden, where obesity prevalence is lower. It will be essential to catch up with the backlog of cases as surgery resumes following Covid-19, ensuring access for the people with severe obesity who can most benefit (14). Only 45% of the country's endocrine departments provide multi-disciplinary weight management services and overall, facilities to help patients with a significant weight problem are inadequate, with low uptake of effective calorie restricted diets.

For excess alcohol consumption, the MUP policy needs at long last to be implemented in England. The latest data from Scotland confirms a net reduction of 4-5% in per adult off-sales of alcohol since the introduction of

MUP and recent data from Australia provide further support(15, 16). A study of 11 interventions showed health gains and cost-savings, with alcohol price increase, or 'volumetric tax' producing the largest health gains(17). In the Northern Territory of Australia, an MUP of \$1.30/standard drink (10g) was introduced in October 2018 as part of wide ranging measures that included a banned drinker register, the aim being to reduce alcohol related harm with a minimum impact on moderate drinkers. The preliminary findings after one year were of a sharp decline in harms associated with alcohol related violence, with significant reductions in hospital admissions and ambulance attendances. In another approach, in the Northwest Territories of Canada, large coloured pictorial labels with cancer warnings were introduced in 2017 and were shown, as well as increasing knowledge and awareness, to reduce population level sales of alcohol by around 7%, indicating a clear impact on drinking behaviours(18).

The Independent Commission on Alcohol Harm set up by the Alcohol Health Alliance, is currently detailing the extensive damage, not just to persons dependent on alcohol but also to partners, families and communities around them. A supporting editorial in the BMJ (19) detailed the risks of heavy drinking not just during lockdown but in the aftermath of financial stress and redundancies. The Government must commit to an Alcohol Strategy to mitigate the damage and protect public health.

### **Masterplan for Improving Survival Rates in Acute Hospitals**

The Chair of the 2013 NCEPOD report (20), in looking at those who died from ARLD, commented '*The first thing I found surprising was how many of these extremely ill people were admitted under doctors who claimed no specialist knowledge of their disease, and how many of them were not then seen by an appropriate specialist within a reasonable period. Of course, we knew that there are comparatively few hepatologists in our healthcare system, only 52 of 191 hospitals claimed to have one. But I expected that the others would employ gastroenterologists with a specialist interest. Yet 45 hospitals admitting seriously ill people who were destined to die of liver disease told us that they had neither a hepatologist nor a gastroenterologist with an interest in the subject.*'

The situation is little different now. In the year to the end of March 2019, 24% of all patients admitted acutely to hospitals in England with severe liver disease died within 60 days, a case fatality rate largely unchanged from that found for the eight years to 2012(21). Better survival continues to be associated with treatment in London, treatment in a transplant centre, and specialist gastroenterological rather than generalist care in other hospitals. Life-expectancy with severe liver disease is much reduced(20); in England and Wales in 2018 the average ages at death from liver disease were 61 years for men, and 63 years for women, whereas the average ages at death for all-causes were 80 and 83 years, respectively. Since 1970, population mortality rates for liver disease in people aged younger than 65 years have risen almost 500%(22) and in 2018, liver disease was the leading cause of death for those aged 35-49 years, accounting for more than 10% of deaths(22).

In 2018/19 only 61% of patients with liver disease admitted acutely were seen by a specialist in gastroenterology or hepatology. The annual Royal College of Physicians (RCP) census(23) shows that although the numbers of consultants are increasing, in 2018 there were only 153 hepatologists, compared with 1417 gastroenterologists. Of the hepatologists, 64 (42%) were working in the seven transplant centres, 70 (46%) in 46 Teaching Hospitals; and 18 (12%) in the remaining 99 hospitals.

The better survival for patients managed by gastroenterologists/hepatologists demonstrates the need for more specialist care. This cannot be achieved by creating a specialist hepatology service in every hospital, nor by transferring every unwell liver patient to a specialist referral centre and the number of gastroenterologists with a special interest in liver disease and/or hepatologists, particularly in the hospitals that currently have no input, has to be increased. However, over the last five years 50% of advertised gastroenterology/hepatology consultant posts, particularly in the DGHs, have been unfilled due to a lack of trainees and this needs to be taken into account in the changes to specialist medical training currently underway. The annual RCP census for each of the last 5 years has shown that around 50% of Physician consultant appointments have been unfilled due to a lack of Physician trainees, and this includes gastroenterology which hepatology trainees derive from. In turn,

there is a shortage of Core Medical Trainees. Indeed, many specialties across medicine are struggling to recruit, and this needs Government to prioritise the expansion of medical student numbers. The Commission estimates it will take around 15 years to see an increase in hepatologists.

Currently shortfalls are filled with locums (if available), often remunerated well above an NHS salary. Increasing training posts in hepatology and thus availability of hepatologists would clearly be a saving. The fact that only half the advertised posts are filled demonstrates that Trusts have identified the money, the constraint is the lack of trainees. As is noted in Scotland, recruitment is hampered by commitments of gastroenterologists/hepatologists in acute take and this needs to be reconsidered.

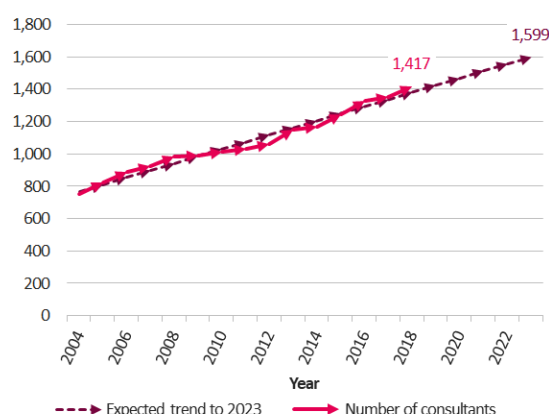


Figure 1: RCP Census of Gastroenterology consultants

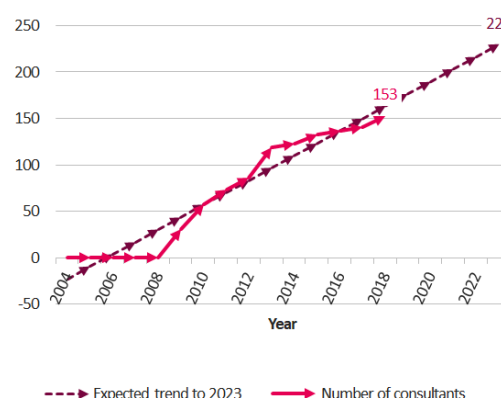


Figure 2: Hepatology consultants. ('Hepatology' only became an option as a primary specialty from 2008)

The overall masterplan recommended by the Commission is based on improving expertise within acute hospitals through the setting up of 30 specialist regional centres providing more complex assessment and treatment, each linked to 4-6 DGHs. The minimum standard of care for every UK hospital that admits patients with liver conditions, is a designated Liver Lead clinician. This would be a hepatologist, or liver-trained gastroenterologist, able to provide oversight of the service as well as ensuring all admitted patients are seen by a specialist gastroenterologist/ hepatologist within 24 hours of admission. The local Liver Lead should be provided with support as set out in the Improving Quality in Liver Services (IQILS) accreditation scheme of the RCP(24) and would be responsible for creating appropriate care pathways, along with local audits to reduce avoidable deaths. The Lead would play a central role in developing community services for patients with liver disorders (including alcohol rehabilitation, community HCV therapy, primary care diagnostics and lifestyle support for those with NAFLD). Establishing local Liver Leads could be met largely through the existing workforce. BSG/BASL survey data has identified a potential liver lead, as a gastroenterologist with an interest in hepatology, in 78% of Trusts. Currently, 52 hospitals have registered (including 28 DGHs) with the IQILs accreditation programme and this number needs to be substantially increased. The framework supports patient centred reorganisation of services and workforce.

At a regional level, the use of a standardised care bundle approach, as discussed in previous Lancet Commission reviews, has recently been shown to reduce variation between hospitals in mortality rates for patients admitted with ARLD (25).

Liver networks based on the 30 specialist centres need to be set up according to geographical and local needs and the current idiosyncratic distribution of services has to change. Regional medical directors should work alongside specialist commissioners to identify appropriate locations and the PHE atlas of variation in liver outcomes provides a framework to identify areas with highest need. Many specialist liver centres are appropriately located but some areas remain ill-served and additional centres will be required. Overall, it is estimated that 6% of the total number of cases currently being admitted to acute hospitals are severely ill and



require specialist care. A regional liver centre might expect 8-12 referrals per week, a manageable number. Funding should be provided through the specialist commissioning service, which should also take responsibility for monitoring outcomes.

For many years, the challenge in implementing the development of a DGH and regional centre masterplan has been the lack of HDU/ITU bed capacity, but the increase mandated by the Covid-19 pandemic provides new opportunities. Additional ITU capacity is likely to be maintained to deal with a future ‘surge’ in Covid-19 cases and could be deployed for severe liver disease in the periods when there is less Covid-19 requirement. This will be dependent on how EDs are reshaped to deal with continuing Covid-19 infected patients and other emergency presentations. Crowding in busy EDs and prevention of Covid-19 spread are fundamentally incompatible, particularly with the additional issue of ongoing staff vacancies (2500 consultants and 4000 nurses).

Whether a referral originates from the ED, primary care or another hospital department, a standardised protocol needs to be agreed for sick liver patients requiring ICU admission. Those fulfilling the criteria for ICU care will need to be transferred to the regional centre, in a timely fashion and usually within 24 hours. ‘Smart ambulance’ technology, effectively deployed for the management of strokes and heart attacks where outcomes have been greatly improved by specialist centres, needs to be developed to ensure that wherever possible patients are admitted immediately to regional units where specialist care can be delivered. Weekly MDTs, for example by video platform, should be part of establishing better communication and dialogue between DGH and regional centres.

Improving hospital outcomes for patients with severe liver disease requires in addition new measures to circumvent/avoid early, unplanned re-admissions of those with decompensated cirrhosis, the commonest factors being recurrent ascites, hepatic encephalopathy and alcohol dependency(26). In one study a scheduled outpatient visit at Day 7 post-discharge to optimise further outpatient care was shown to reduce hospital readmissions and emergency department attendances(27). The visit should ensure patients with cirrhosis/severe fibrosis are entered into a surveillance programme for early detection of hepatocellular carcinoma (HCC), with the steadily rising death rates for this complication.

### **Improving Outcomes of Childhood Liver Disease**

Late diagnosis of neonatal liver disease remains the main cause of chronic liver disease, necessitating liver transplantation(28). In Taiwan and in Canada, the use of stool colour charts has effectively abolished late presentation of biliary atresia. This has led to a significant fall in mortality and a reduction in the numbers and costs of early transplants by ensuring surgery took place before 90 days (29-31). The inclusion of a stool colour chart in the Personal Child Health Record (PCHR, the ‘Red Book’), which is given to all parents, would alert health visitors to refer infants for measurement of conjugated bilirubin level in blood to confirm the diagnosis. The impact of liver disease on the developing brain in infants and children also needs to be addressed. Deficits in all areas of neurodevelopment, including cognitive, behavioural and motor development, are described and up to 42% of children post liver transplantation have additional educational needs(30, 31). Similar to NICE guidance for children born preterm, those with liver disease require enhanced developmental surveillance including formal assessments by a multidisciplinary team of health professionals at set times during infancy and longer-term (32)(NICE guideline 13). Collaboration with educational psychologists will be important in achieving the goal of “meaningful survival” (11).

The high prevalence of non-adherence to treatment - particularly following transplantation – has also highlighted the need for dedicated specialist care during the period of transition from paediatric to adult services, with the appointment of a dedicated young person’s champion in each centre. In a National Survey, out of 18/26 secondary/tertiary adult liver centres which responded to an online questionnaire, only 50% had a liver transition service(33). In these centres, young adults were more likely to have adequate knowledge about their condition, better adherence to treatment, and were less dependent on the paediatric provider.

### **Alcohol Care Teams in Integration of Alcohol and Liver Care**

1 Around 30% of wholly alcohol-attributable admissions are due to ARLD(34) and it is important that ACTs have  
2 close links with acute liver services to ensure expert care of both alcohol addiction as well as of liver disease in  
3 these patients. It is estimated that one in 10 patients in acute hospitals are alcohol dependent, and a further 20%  
4 are harmful drinkers(35). The key components of effective ACTs include a clinician-led multidisciplinary team,  
5 a 7-day alcohol specialist nurse service (ASN), integrated addiction and liaison psychiatry services, and medical  
6 consultants with expertise in liver disease(36). A Quality, Innovation, Productivity and Prevention (QIPP) case  
7 study published by NHS Evidence and NICE in 2016 describes how ACTs have been shown to significantly  
8 reduce avoidable bed days and readmissions(37). Modelling suggests that an ACT in a non-specialist acute  
9 hospital will save 254,000 bed days and 78,000 admissions annually by year three, with a cost saving of £3.85  
10 for each £1 invested by year one of full optimisation(37).

11 In spite of this evidence and numerous reports recommending national roll-out of ACTs, a full implementation  
12 has not been achieved due in part to a lack of priority in terms of policy and commissioning, a lack of clarity as  
13 to whether ACTs should be funded by the NHS or local authorities (which took over responsibility for  
14 commissioning alcohol treatment services following the Health and Social Care Act of 2012), and  
15 simultaneously widespread cuts to the Public Health Grant to local authorities (see below).

16 In 2019, The NHS Long Term Plan for England(38) aimed to expand the capacity of ACTs and identified the  
17 CCGs' health inequalities funding supplement as a legitimate source of funding(38). The following year, NHS  
18 England & NHS Improvement (NHSE&I) and PHE published a core service descriptor for ACTs with national  
19 funding planned for additional or improved ACT services in areas of high prevalence of alcohol  
20 dependence(39). The need for this programme to be implemented remains a priority, particularly with the  
21 increase in high risk drinking during the Covid-19 pandemic(40). There also needs to be a greater focus on  
22 improving the clinical competencies of staff working in ACTs and hepatology, with appropriate training  
23 programmes(41).

#### 24 *Alcohol assertive outreach treatment*

25 Frequent attenders to hospital for alcohol-related reasons place a disproportionate burden on the NHS,  
26 accounting for 59% of all alcohol-attributable admissions. Clustered in areas of high deprivation (correlation  
27  $r=0.74$ )(42), they often do not engage with community addiction services and many have ARLD, as well as  
28 untreated mental health co-morbidities. Alcohol Assertive Outreach Treatment (AAOT) involving assertive  
29 engagement and intensive case management has been shown to reduce re-hospitalisation by up to 50%(42). The  
30 2017 national survey in England identified 37 acute NHS trusts (24%) providing elements of AAOT(43).  
31 However, only 6 of these services (16%) provided all 6 components of effective AAOT, and the majority lacked  
32 a multidisciplinary team provision and/or were not resourced sufficiently. Implementation of AAOT has been  
33 hampered by the same policy and funding barriers identified for ACTs.

35 A service evaluation of AAOT in South London in 2018 showed that compared to standard care, AAOT saved  
36 £13,548 per patient in the first year in reduced inpatient bed days alone. Less the cost of intervention of £2,979  
37 per patient, this provides a net short-term cost saving of £10,569(42). If AAOT was rolled-out nationally in  
38 England to the estimated 54,369 alcohol-related frequent hospital attenders, estimated savings of £575 million  
39 could be achieved within a year with an implementation cost of £161 million, or a return of investment of £3.42  
40 for each £1 spent(42).

#### 42 *Specialist Community Alcohol Treatment*

43 The success of hospital-based alcohol care is crucially dependent upon a continuing care pathway in the  
44 community. The 18% (£162 million) cut to the funding for Local Authority community addictions services in  
45 England has led to a 22% reduction in the number of people entering specialist alcohol treatment. In 2018/19,  
46 82% of people with alcohol dependence in England did not access specialist alcohol treatment. Specialist NHS  
47 addiction consultants have been reduced by 48%, with a 60% reduction in the number of specialist addiction  
48 trainees in the last 10 years(11). Table 1 shows, for the four nations of the UK, the specialist alcohol treatment  
49 access ratios ie the number of alcohol use disorder (ICD-10 F10) admissions to NHS hospitals relative to the  
50 number of people accessing alcohol treatment in a given year. Between 2016/17 and 2018/19, the ratios have

remained relatively stable in Scotland and Wales, but have increased in England and Northern Ireland, which now have approximately a third and a fifth of the level of access in Scotland, respectively. This means that community-based specialist alcohol treatment services in England and Northern Ireland are increasingly ill-equipped to respond to the prevailing level of need in the community, including the aftercare needs of patients discharged from hospital with ARLD.

**Table 1: Specialist alcohol treatment access ratios across the United Kingdom in 2018/19 compared to 2017/18 and 2016/17**

Country	Number accessing treatment for alcohol only in 2018/19 <sup>1</sup>	Number of F10 alcohol hospital admissions in 2018/19 <sup>2</sup>	Treatment access ratio (F10 admissions/ treatment access) 2018/19 <sup>3</sup>	Treatment access ratio (F10 admissions/ treatment access) 2017/18 <sup>3</sup>	Treatment access ratio (F10 admissions/ treatment access) 2016/17 <sup>3</sup>
Scotland	26,536	27,474	1.0	1.0	1.1
Wales	8,344	12,266	1.5	1.5	1.5
England	75,555	220,731	2.9	2.6	2.4
Northern Ireland	2,560	12,548	4.9	3.9	3.9
<b>United Kingdom</b>	<b>112,995</b>	<b>273,019</b>	<b>2.4</b>	<b>2.2</b>	<b>2.1</b>

<sup>1</sup>Excludes concurrent drug misuse as a reason for treatment.

<sup>2</sup>Primary or secondary diagnosis of ICD\*10 F10 'Mental and Behavioural Disorders due to Use of Alcohol'. This is a proxy measure of the prevalence of alcohol dependence in the general population(44). (\* International Statistical Classification of Diseases and Related Health Problems)

<sup>3</sup>The treatment access ratio is the number of F10 admissions to NHS hospitals divided by the number of people accessing specialist alcohol treatment. The lower the ratio the more favourable the level of access to treatment

### Early Detection of Liver Disease in Primary Care and High-Risk Groups

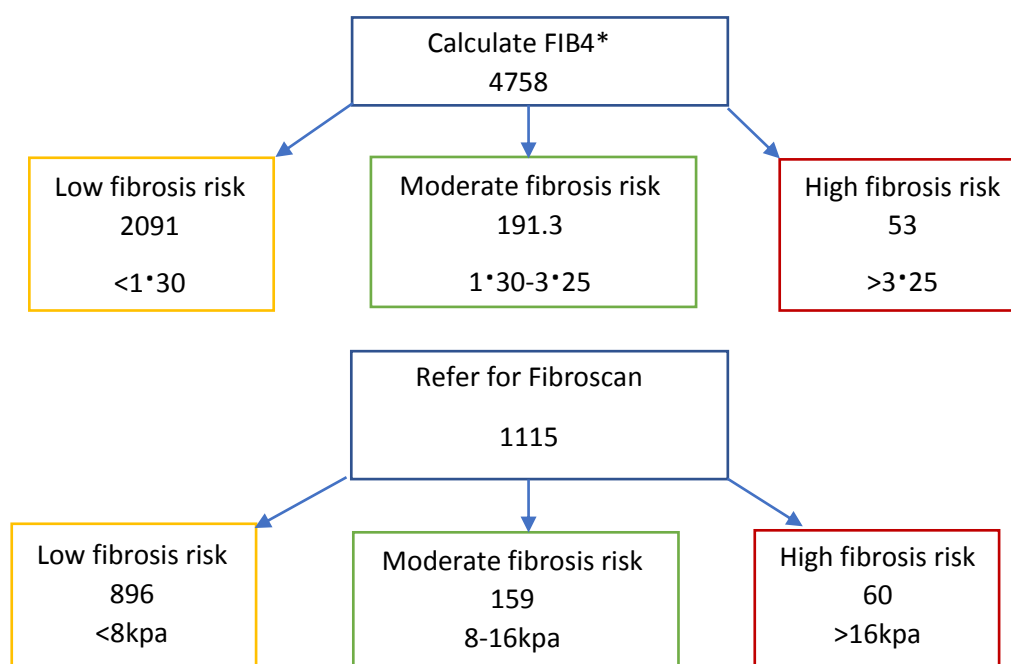
Early identification and management of liver disease is an essential pre-requisite to improving outcomes and avoiding complications of both NAFLD and ARLD. Primary care plays a pivotal role in identifying patients who are at risk and should be central to case finding and initial interventions, although it remains a challenge to mobilise primary care at scale to take a more proactive role, given other perceived priorities. Nevertheless, the Covid-19 pandemic has had the unexpected effect of accelerating utilisation of digital solutions and pathways in primary care and the interface with hospital care. This has the potential to transform care by allowing for better and more consistent early identification of people at risk of developing liver disease as well as for better management and follow up of people with established disease. Examples of excellent practice already exist but these tend to be in pockets and need to be widely replicated throughout the country. Evidence suggests that introducing a two-tier system to screen patients in primary care for liver fibrosis is the most cost effective strategy(45). This comprises an initial simple screening test with a high negative predictive value (eg FIB-4 or NAFLD Fibrosis Score, NFS) with a second test reserved for detecting advanced fibrosis in those with a high or indeterminate score. Examples of second line tests with suitable accuracy include the Enhanced Liver Fibrosis

1 (ELF) blood test, the Acoustic Radiation Force Impulse (ARFI) technique, and transient elastography  
2 (FibroScan), of which a detailed Medtech Innovation Briefing from the National Institute for Health and Care  
3 Excellence has been recently published(46).

4  
5 An integrated primary-secondary care pathway was established by hepatologists in Portsmouth in 2014, for  
6 assessing and managing patients with NAFLD across three CCGs with a combined adult population of over  
7 650,000. If the NFS indicated low risk, patients stayed in primary care and were issued with standardised advice  
8 regarding cardiovascular risk and weight management. Higher risk patients were referred directly to a  
9 hepatology consultant clinic for further management. Those with an indeterminate risk were seen in a dedicated  
10 nurse-led NAFLD clinic which included performance of a FibroScan, with the patients returned to primary care  
11 if the FibroScan reading is <7.9 kPa or referred on to a consultant if 8.0 kPa or higher. An evaluation of the first  
12 900 patients seen in the nurse-led NAFLD clinic showed 70% could be discharged to primary care on the first  
13 visit(47). Similarly, in a North London population, improvements in fibrosis detection and quality of referrals  
14 were seen using a two-step algorithm of FIB-4 followed by ELF. The pathway led to a four-fold improvement in  
15 detecting advanced fibrosis and an 88% reduction in unnecessary referrals(45).

## Mid-Hampshire Fibroscan Project – One Year Pilot

18 participating GP surgeries: high risk groups – diabetes, BMI, alcohol consumption assessed



**Figure 3: The Mid-Hampshire FibroScan project**

The availability of a more portable, mini FibroScan machine has allowed greater accessibility in GP surgeries and community centres. The results of an unpublished pilot study initiated in early 2019 in the Mid-Hampshire CCG (Figure 3) have led to a better calibration of the high-risk category referred to hospital. This pilot was the first to make Fibroscan available for GPs to use directly and in primary care. The costs are £24 per scan in the community, and the potential savings from early diagnosis are clear. Prevention of progression to liver cirrhosis and ultimately transplant represents a saving of at least £12,000 per patient, with an ICU bed priced at £1328 /day and a general hospital bed £195. The mid-Hampshire pilot of 1115 scans in 2019 cost £26,760, or equivalent to 20 ICU days (personal communication, Dr Harriet Gordon).

Most approaches to early diagnosis have been based on abnormal liver enzymes as the entry point to a liver diagnostic pathway whereas the Scarred Liver Project in Nottinghamshire uses identification of risk (obesity, diabetes and alcohol excess) as the primary trigger for investigation including FibroScan examination. In four Nottinghamshire CCGs (700,000 population) over 12 months, of 968 patients attending, 222 (23%) patients had an elevated liver stiffness ( $\geq 8\text{kPa}$ ) and in 60 (27%) liver stiffness was indicative of advanced chronic liver disease. If a traditional approach based on raised liver enzymes had been followed, 39% of those with significant liver disease ( $\geq 8\text{kPa}$ ) would have gone undetected(48).

The development of electronic medical records (EMR) in the majority of mainstream primary care offers significant and untapped opportunities for identification of patients at risk. Various algorithms are in development that could identify such cohorts directly from their electronic records. Once identified, these can be directed for onward referral utilising automated digital referral processes. In addition, clinical decision support can also be deployed within the EMR to assist practitioners in their management of patients along appropriate pathways, further accelerating the referral process and improving outcomes. The opportunities, based on digital modalities, to deploy a national co-ordinated response to prevention and intervention in those with risk factors for liver disease, integrated within the current mandated Healthcheck, should be a matter of

national priority. Primary care would still need to remain engaged in the care of the patients through well designed notification processes and GPs would retain the ability to intervene in the pathway where appropriate, given their knowledge of the patients and their families. The administrative burden of follow up for these patients could also be simplified using automated call and recall systems.

ARLD generates challenges around early detection as there is significant under reporting of alcohol use within medical records. This may well lessen the potential of algorithmic digital approaches to case finding which is further compounded by the greater proportion of patients who do not proceed to investigation or treatment. However, there are other routes for detection of heavy drinkers, for example through drink driving or domestic violence records. A more consistent coordinated multidisciplinary community and hospital approach is needed to increase the likelihood that patients and their families get the treatment they require and improve outcomes to this major cause of preventable deaths.

## **Hospital Plans in Scotland, Wales and Northern Ireland**

### ***Scotland***

The latest figures for the MUP policy for alcohol show that in the year following its introduction, cider consumption fell by 18.6%, in contrast to England & Wales where it rose by 8.2%(49), confirming a net reduction of 4-5% in adult off-sales already referred to. In the financial year 2018-19, which includes 10 months post-MUP, the European Age-Sex Standardised Rates (EASR) for hospital stays due to ARLD fell from 139.9 in 2017-18 to 129.3, having been rising or static for each of the previous five years(50). The longstanding and recurring staff shortages facing DGHs is of concern, as in England. Few health boards have formal ACTs.

Pre-symptomatic diagnosis of liver disease relies on the opportunistic detection of abnormal LFTs, for which various pathways are employed to aid diagnosis and staging. Intelligent Liver Function Tests (iLFTs), the automated analysis and interpretation of abnormal LFTs in primary care developed and piloted in Tayside(51), improves the efficiency of diagnosis and work is currently underway to extend/adapt iLFTs in other Health Boards. As many patients even with advanced liver disease have normal LFTs(48), an additional approach to pre-symptomatic diagnosis is necessary, based on the use of liver fibrosis markers, including FIB-4 score. The potential target in Scotland is the 40,000 at risk drinkers in primary care identified annually by the national Alcohol Brief Intervention (ABI) programme(52). A pilot project in Edinburgh demonstrated that FibroScan use in an alcohol treatment setting is feasible and worthwhile(53) and as in England, the systematic use of liver fibrosis markers and FibroScans in high risk groups is being strongly recommended.

### ***Wales***

The Gwent Liver Unit was commissioned to undertake a pilot study of routine testing for the AST liver enzyme and referral for FibroScan if the AST:ALT ratio is >1. In two years, 18,000 people were risk assessed and 192 identified with advanced fibrosis, with the coded diagnoses of cirrhosis increasing by 81% (Unpublished data. Personal communication Andrew Yeoman). This pilot has formed the backbone of a new Welsh national liver blood test pathway, incorporating assertive fibrosis testing being launched in summer 2020. A free, comprehensive, online education resource has been produced for all primary care clinicians in Wales to improve understanding of liver blood test assessment, rationale for fibrosis testing and management of risk factors. The Wales Liver Plan is also funding a Liver Disease Support Worker in each Health Board for two years to increase FibroScan capacity, take testing into the community and, in future, extend testing to those with NAFLD and alcohol misuse.

A national ACT working group has been convened to engage with the Values Based Healthcare framework in producing a “Benefits Realisation” report for the Chief Medical Officer (CMO) and which will complement the impact of the introduction of MUP in Wales, which came into force on 2<sup>nd</sup> March 2020. Finally, a Welsh Parliament Cross Party Working Group has been convened to focus on engagement with politicians and to drive progress in the three key areas aligned to the Lancet Commission priorities of hospital care, alcohol care teams and early detection.

## **Northern Ireland**

Consultant-led ACTs are in place in three of the five trusts in Northern Ireland. The remaining two trusts have lost their alcohol specialist nurse (ASN) posts as a result of the implementation by the Department of Health of the Rapid Assessment, Interface and Discharge (RAID) model of liaison psychiatry services. Many ASNs were not suitable for redeployment as RAID practitioners because they had no formal mental health training but the aim remains to create ACTs in all Trusts, along with prioritising and protecting valuable ASN services.

Data from 2016/17 to 2018/19 show that in the 20% most deprived areas, the standardised alcohol related admission rate was four times that in the 20% least deprived areas (1,410 and 353 admissions per 100,000 population respectively)(54). In addition, the alcohol specific standardized death rate was more than four times higher (31.7 and 7.6 deaths per 100,000 population, respectively)(54). Targeted intervention in the deprived areas is required, the data strengthening the call for the introduction of MUP which was delayed by the suspension of the devolved government assembly for three years until January 2020, and which is now being considered as part of a new substance misuse strategy. The results show alcohol harm remains a serious health inequalities issue.

## **Conclusions:**

Implementation of the main recommendations detailed in this report of the Lancet Commission should result in improved outcomes and survival rates for both chronically and acutely sick liver patients requiring hospital admission. The comprehensive masterplan described incorporates better expertise in all acute hospitals, with Lead and Deputy Lead positions optimising 24/7 emergency cover, along with active links to 30 specialist regional centres. As well as ensuring better cover for deprived areas, it represents an integrated, high quality service which can work alongside the likely reconfiguration of hospitals and particularly HDU and ITU facilities consequent on the Covid-19 pandemic. Fully staffed ACTs in every hospital dealing with liver patients will also aid in the care of the commonest group of admissions, namely those with ARLD. Close links with the hospitals liver services will be essential and there also need to be joint follow-up arrangements between ACTs and hepatologists for patients after discharge from hospital, to reduce the current high readmission rates. The Commission strongly recommends that cuts in addiction specialist posts should be reversed, so that AAOTs can be established to maintain long-term care outside the hospital, with substantial financial savings to the NHS. Implementation of ACT programmes with connection to hospital liver services in all hospitals would deliver an average net saving of £448,000 for an implementation cost of £157,000 per hospital in the first year. Development of AAOTs to reduce pressure created by repeat attenders and their implementation on a national level, would cost £161m but release savings to the NHS of £575m(41).

Studies showing the value of the transient elastography (FibroScan) technique in detection of severe fibrosis/cirrhosis in asymptomatic individuals in primary care, are the basis for a strong recommendation that this technique should be widely implemented throughout the UK. The importance of each CCG having a diagnostic care pathway in place cannot be over emphasised. Assessment of alcohol consumption, as mandated in the adult Healthcheck carried out in primary care, needs to be properly recorded to facilitate the greater use of interventions of proven benefit. The potential value of digital technology in improving consultations in general practice, which has come to the fore during recent Covid-19 experience and increased the involvement of patients in their own care pathways, is also detailed and strongly recommended in the report.

Finally, the importance of tackling public health hazards of alcohol, obesity and diabetes in reducing the burden of liver disease in the UK is further strengthened by the striking effects of such co-morbidity on the mortality of Covid-19 infection, especially given the possibility of further waves of the infection. It is only by a comprehensive public health approach, including the long overlooked alcohol strategy, that Westminster Government can turn the tide of liver deaths, especially in younger people of working age. An extension of the levy on sugar content in drinks to foodstuffs should be part, the Commission strongly recommends, of the more active measures now being considered by Government. The further evidence internationally of the effectiveness of MUP, along with latest results from Scotland given in the report, add to an unassailable case for its urgent implementation, as well as proper labelling of alcohol products to include calorie content and health warnings.

The need to address deficiencies in the liver and addiction plans of the devolved nations similar to those in England is highlighted and the box summary of main recommendations includes measures to improve long-term outcomes in children with liver disease.

#### Box 1: Summary of main recommendations

1	Establish a Lead and Deputy Liver Lead in each acute hospital, to take responsibility for 24/7 care of acute admissions and closely linked to one of 30 regional hubs. These regional centres require HDU/ITU capacity and facilities for specialist treatment.
2	Increase the number of training posts in Hepatology. Currently hospitals are advertising funded posts but there are insufficient trainees to fill them, leading to higher staff costs for locum posts. There is also urgent need to reverse the fall in training posts in addiction psychiatry
3	Extend 7-day alcohol care team to all acute hospitals, with appropriate links to liver services.
4	Utilise aggressive outreach services in the community to support frequent hospital attenders with alcohol use disorders. Reverse the decline of alcohol treatment services
5	Expand primary care access to FibroScan for detection of severe fibrosis/cirrhosis in asymptomatic individuals within high risk groups. Assess liver health as part of the adult HealthCheck.
6	Prioritise public health by extending soft drinks levy to foods, introduce meaningful alcohol labelling and intensify Government recommendations on physical activity to reduce levels of obesity and diabetes.
7	Facilitate translation of best practice across and between health systems of the four nations
8	Increase survival and improve outcomes for young people through earlier diagnosis of biliary atresia by adopting stool colour charts as part of neonatal screening and enhanced neurocognitive developmental surveillance

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**New Dimensions for Hospital Services and Early Detection of Disease**  
**A report from the Lancet Commission into Liver Disease in the UK**

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## Executive Summary

The report, in addressing the unacceptable high mortality of acute liver admissions to hospital, reinforces the necessity for ~~an~~ integrated clinical services. The masterplan described is based on regional, geographically ~~–~~sited liver centres, each linked to four to six surrounding district general hospital (DGHs) - a pattern of care similar to that successfully introduced for stroke services. The plan includes establishment of a Lead and Deputy Lead Clinician in each acute hospital, preferably a hepatologist or gastroenterologist with liver interest, who will have prime responsibility for organising care of acute liver admissions on a 24/7 basis. Essential for the plan is greater access to Intensive Care Unit/High Dependency Unit (ITU/HDU) facilities in line with Covid-19 experience and associated reconfiguration of emergency care. The report strongly recommends full implementation of the Alcohol Care Teams (ACT) programme in hospitals and improved working links with the acute medical services. The Commission also endorses recommendations from paediatric liver services to improve overall survival figures by earlier diagnosis of biliary atresia based on stool colour charting, and by better care of impaired cognitive ability and developmental mental health problems.

Pilot studies of earlier diagnosis have shown encouraging progress with 5-6% of previously undiagnosed cases of severe fibrosis/cirrhosis identified through use of a portable FibroScan in primary care. Similar approaches to the detection of early asymptomatic disease are described in accounts from the devolved nations and the potential of digital technology in improving the value of clinical consultation and screening programmes in primary care is highlighted.

The striking contribution of co-morbid factors to the mortality of Covid-19, particularly obesity and diabetes - with excess alcohol consumption known to be a major factor in obesity - reinforces the need for fiscal and other long delayed regulatory measures to reduce prevalence of obesity. These include,~~including~~ the food sugar levy, as well as the introduction of the Minimum Unit Price (MUP) policy in reducing alcohol consumption. Improving public health, the Commission emphasises, will not only mitigate the severity of further waves of Covid-19 infection but is critical to reducing an unacceptable disease burden from liver disease in the UK.

### Introduction

The remit from the Lancet to the Commission, following its report in November 2019, was to address the continuing high mortality figures for severely sick liver patients admitted to acute hospitals, figures which are seven times higher than those for stroke and eight times higher than for myocardial infarction<sup>(4)</sup>. The Commission was also asked to examine earlier detection of liver disease through screening of high-risk subjects in primary and community care. The findings on the importance of co-morbidity factors, particularly obesity and diabetes, in the fatal cases of Covid-19 are addressed and demonstrate the need to improve public health before,~~with the necessity for improving public health before possible~~ further waves of infection emerge, as well as ~~in-reducing~~ the current disease burden of liver disease. Reports of the change in the attitude of the Prime Minister towards actively tackling obesity in the UK gives some encouragement that the effective measures endorsed by the Commission, which have already been proposed by the Department of Health and Social Care, may be finally ~~be~~-adopted.



The masterplan described for the hospital service takes into account the large number of unfilled hepatology consultant posts and the likely reconfiguration of acute-in hospitals ~~of acute~~ services following the Covid-19 experience, with increased ITU capacity left in place for potential outbreaks of Covid-19 and the necessary resilience to maintain other clinical priorities. The role of the ~~A&E~~ Emergency Department (ED) in the triage of sick patients including Covid-19 infected patients requiring admission, is also examined. The further development of Alcohol Care Teams in hospitals, for which there is a commitment in the Westminster Government's long-term plan for the NHS, provides an opportunity for improving the care of patients with Alcohol Related Liver Disease (ARLD) – and ~~also for~~ by integrating acute liver services with community care through Assertive Outreach Clinics, to reduce the number of readmissions. New approaches in the section on paediatric liver disease include earlier diagnosis of biliary atresia, and at the other end of that age range, the need for better transitional care arrangements to adult life including expert neuro-developmental care.

Earlier detection of liver disease in community care, when treatment can be more effective, is the subject of a number of new surveys described in the report, with use of portable FibroScan machines commissioned by local Clinical Care Commissioning Groups (CCGs). Although since 2013 there has been a legal duty that Local Authorities facilitate offering an alcohol risk assessment in primary care<sup>(21)</sup>, a recent analysis of the national dataset has shown that the proportion of people who recall getting advice about safe alcohol consumption is low compared to other elements of the Healthcheck<sup>(3)</sup> This section in the report also includes reference to use of digital routes in supporting clinical consultations.

Finally, in the report there are progress accounts from Scotland, Wales and Northern Ireland on their respective liver plans.

### Co-Morbidity of Covid-19 Infection and Improvement of Public Health

Of the co-morbidities present in 90% of the fatal Covid-19 cases, obesity and type II diabetes were the most frequent. Patients with obesity are 40% more likely to die or deteriorate rapidly when admitted to hospital (4, 5)3.4. Diabetes is present in around 28% of fatal cases compared to a background prevalence of 5.9% in England. The latest report from the Intensive Care National Audit and Research Centre (ICNARC) used data up to 21 May 2020 and showed that 7.7% of patients critically ill in intensive care units (ICU) with confirmed Covid-19 were morbidly obese compared with 2.9% of the general population (after adjusting for age and sex). This disparity was also seen when looking at white and non-white patients separately(65). The report also showed a relationship between BMI and death from Covid-19 in BMI over 30 kg/m<sup>2</sup>. An early study from Beijing(76) reported that progression to severe disease was more likely in those with underlying Non-alcoholic Fatty Liver Disease (NAFLD). Viral shedding was also more prolonged, making these patients more infectious for a longer ~~period of time~~. Other data from China shows that the severity of disease increases with a body mass index (BMI) of >23kg/M<sup>2</sup> (87), highlighting the fact that metabolic consequences of weight gain affect ethnic minorities at a lower BMI(98).

In Covid-19 infection, UK data ~~are~~ emerging of the hazards of liver disease ~~in Covid-19 infection~~, identified as an independent risk factor for mortality in a study of more than 17 million adult NHS patients (fully adjusted RR 1.61 (1.33-1.95) including age, gender and ethnicity). Moreover, moderate/severe liver disease has emerged as a comorbidity along with cardiorespiratory and diabetes mellitus for ITU admission, predicting around a 50% mortality if present(109). Systematic reviews of the global data also showed patients with severe Covid-19 had higher rates of liver injury (2.20 [1.60-3.02]; p<0.00001) compared with those

with non-severe disease(~~44~~10). These findings strongly reinforce the need to tackle the prevalence of lifestyle factors that have been the subject of numerous Liver Commission and public health reports (11,12). Obesity and alcohol consumption are recognised as substantial risk factors for many common cancers including breast and colon as well as for ~~age-age-~~related complications including strokes, cardiac events and dementia(~~12, 13~~). Aside from health benefits to the individuals concerned, enhancing population health should increase societal resilience against future waves of Covid-19 infection.

~~Specifically for~~To tackle obesity, changes to urban infrastructure are needed ~~both to~~ encourage both walking and cycling, with the benefits of increasing physical activity adding to those of improved diet and calorie restrictions. Proposals in Chapter 2 and 3 of the Government Child Obesity Plan(~~14~~13), most of which have been stalled at the consultation stage, need to be implemented, with restrictions on promotion and advertising of unhealthy foods extended to adults. Fiscal measures, namely a tax on ~~levies on~~ dietary sugar and saturated fat, need to be put in place to encourage reformulation of products by industry. Bariatric surgery rates are lower in this country than in others, such as France and Sweden, where obesity prevalence is lower, ~~and it~~ will be essential to catch up with the backlog of cases as surgery resumes following Covid-19, ensuring access for the people with severe obesity who can most benefit ~~from it~~(154). Only 45% of the country's endocrine departments provide multi-disciplinary weight management services and overall, facilities to help patients with a significant weight problem are inadequate, with ~~the low~~ uptake of effective calorie restricted diets, ~~an effective approach, low~~.

For excess alcohol consumption, the MUP policy needs at long last to be ~~pushed through~~implemented in England. The latest data from Scotland confirms a net reduction of 4-

5% in per adult off-sales of alcohol since the introduction of MUP and recent data from Australia provides further support(16, 17)15,16. ~~A—including a~~ study of 11 interventions ~~showed producing~~ health gains and cost-savings, ~~with indicating that~~ alcohol price increase, or ‘volumetric tax’, producinged the largest health gains(18). In the Northern Territoryies of Australia, an MUP of \$1.30/standard drink (10g) was introduced in October 2018 as part of measures which included a banned drinkers register, the aim being to reduce alcohol related harm with a minimum impact on moderate drinkers. The preliminary findings after one year were of a sharp decline in harms associated with alcohol related violence, with significant reductions in hospital admissions and ambulance attendances. In another approach, in the Northwest Territories of Canada, large coloured pictorial labels with cancer warnings were introduced in 2017 and were shown, as well as increasing knowledge and awareness, to reduce population level sales of alcohol by around 7%, ~~as well as having~~indicating a clear impact on drinking behaviours(1918).

The Independent Commission on Alcohol Harm set up by the Alcohol Health Alliance, is currently detailing the extensive damage, not just to persons dependent on alcohol but also to partners, families and communities around them. A supporting editorial in the British Medical Journal (19) detailed the risks of heavy drinking not just during lockdown but in the aftermath of financial stress and redundancies. Th eGovernment must commit to an Alcohol Strategy to mitigate the damage and protect public health. ~~—data from the charity Alcohol Change UK (the subject of a recent BMJ editorial(20)) showing that one in five people have reported drinking more during lockdown, with fourfold increases in traffic to alcohol charity websites for advice.~~

## Masterplan for Improving Survival Rates in Acute Hospitals

The Chair of the 2013 NCEPOD report (2420), in looking at those who died from ~~Alcohol~~ Related Liver Disease ARLD, commented *'The first thing I found surprising was how many of these extremely ill people were admitted under doctors who claimed no specialist knowledge of their disease, and how many of them were not then seen by an appropriate specialist within a reasonable period. Of course, we knew that there are comparatively few hepatologists in our healthcare system, only 52 of 191 hospitals claimed to have one. But I expected that the others would employ gastroenterologists with a specialist interest. Yet 45 hospitals admitting seriously ill people who were destined to die of liver disease told us that they had neither a hepatologist nor a gastroenterologist with an interest in the subject.'*

The situation is little different now. In the year to the end of March 2019, 24% of all patients admitted acutely to hospitals in England with severe liver disease died within 60 days, a case fatality rate largely unchanged from that found for the eight years to 2012(2221). Better survival continues to be associated with treatment in London, treatment in a transplant centre, and specialist gastroenterological rather than generalist care, in other hospitals. Life-expectancy with severe liver disease is much reduced(2420); in England and Wales in 2018 the average ages at death from liver disease were 61 years for men, and 63 years for women, whereas the average ages at death for all-causes were 80 and 83 years, respectively. Since 1970, population mortality rates for liver disease in people aged younger than 65 years have risen almost 500%(2322) and in 2018, liver disease was the leading cause of death for those aged 35-49 years, accounting for more than 10% of deaths(2322).

In 2018/19 only 61% of ~~acutely admitted~~ patients with liver disease were seen by a specialist in gastroenterology or hepatology. The annual Royal College of Physicians (RCP) census(2423) shows that although the numbers of consultants are increasing, in 2018 there

were only 153 hepatologists, compared with 1417 gastroenterologists. Of the hepatologists, 64 (42%) were working in the seven transplant centres, 70 (~~54~~46%) in ~~25 of the~~ 46 Teaching Hospitals; and 18 (12%) in ~~12 of~~ the 99 other hospitals.

The better survival for patients managed by gastroenterologists/hepatologists ~~is indicative of~~ demonstrates the need for more specialist care. This cannot be achieved by creating a specialist hepatology service in every hospital, nor by transferring every unwell liver patient to a specialist referral centre and the number of ~~interested~~ gastroenterologists with a special interest in liver disease, and/or hepatologists, particularly in the hospitals that currently have no input, has to be increased. However, over the last five years 50% of advertised gastroenterology/hepatology consultant posts, particularly in the ~~DGS~~ DGHs, have been unfilled due to a lack of trainees and this needs to be taken into account in the changes to specialist medical training currently underway. The annual RCP census for each of the last 5 years has shown that around 50% of Physician consultant appointments have been unfilled due to a lack of Physician trainees, and this includes gastroenterology which hepatology trainees derive from. In turn, there is a shortage of Core Medical Trainees. Indeed, many specialities are struggling to recruit, and this needs Government to prioritise the expansion of medical student numbers. The Commission estimates it will take around 15 years to see an

~~increase in hepatologists. As is noted in Scotland, recruitment is hampered by commitments of gastroenterologists/hepatologists in acute take and this needs to be reconsidered.~~

~~Currently shortfalls are filled with locums (if available), often remunerated well above an NHS salary. Increasing training posts in hepatology and thus availability of hepatologists would clearly be a saving. The fact that only half the advertised posts are filled demonstrates that Trusts have identified the money, the constraint is the lack of trainees. As is noted in Scotland, recruitment is hampered by commitments of gastroenterologists/hepatologists in acute take and this needs to be reconsidered.~~

The overall masterplan recommended by the Commission is based on improving expertise within acute hospitals through the setting up of 30 specialist regional centres providing more complex treatment and assessment, each linked to 4-6 DGHs. The minimum standard of care for every UK hospital ~~that admits patients with liver conditions, within the 191 hospitals in the country that admit patients with a liver condition, is~~ designated Liver Lead clinician. This ~~would be~~ a hepatologist, or liver-trained ~~interested physician gastroenterologist, able to, in a~~ Lead position who provides an oversight ~~view~~ of the service as well as ensuring that all ~~admitted~~ patients are seen by a specialist gastroenterologist/ hepatologist within 24 hours ~~of admission~~. The local Liver Lead ~~(along with a deputy) should~~ ~~has to~~ be provided with support as set out in the Improving Quality in Liver Services (IQILS) accreditation scheme ~~(2524)~~ of the RCP and ~~will~~ ~~would~~ be responsible for creating appropriate care pathways, along with local audits to reduce avoidable deaths. The ~~local liver~~ ~~L-lead is likely to~~ ~~would~~ play a central ~~be a gastroenterologist with an interest in hepatology, currently identifiable in 78% of Trusts. The Liver Lead should also play a central role in~~ developing community services for patients with liver disorders (including alcohol rehabilitation,

community HCV therapy, ~~improved~~ primary care diagnostics and ~~dietary-lifestyle~~ support for those with NAFLD). Establishing local Liver Leads could be met largely through the existing workforce. BSG/BASL survey data has identified a potential liver lead, as a gastroenterologist with an interest in hepatology, in 78% of Trusts. Currently, 52 ~~Trusts~~ hospitals have are registered (including 28 DGHs) in the IQILs accreditation programme and this number needs to be substantially increased. The framework ~~involves~~ supports patient centred reorganisation of services and workforce ~~with a specialist hepatology tariff.~~

At a regional level, the use of a standardised care bundle approach, as discussed in previous Lancet Commission reviews, has recently been shown to reduce variation between hospitals in mortality rates for patients admitted with ARLD (25).

The ~~The~~ liver networks based on the 30 specialist centres need to be set up ~~in accordance to~~ in ~~with~~ geographical and local needs and the current idiosyncratic distribution of services has to change. ~~so that centres are established where the need is identified.~~ Regional medical directors should work alongside specialist commissioners to identify appropriate locations and the PHE atlas of variation in liver outcomes provides a framework to identify areas with highest need. Many ~~of the current~~ specialist liver centres are appropriately located but some areas remain ill-served and additional centres will be required. Overall, it is estimated that 6% of the total number of cases currently being admitted to acute hospitals are severely ill and require specialist care. A regional liver centre might expect 8-12 referrals per week, a ~~not~~ unmanageable number. Funding should be provided through the specialist commissioning service, ~~which~~ who should also take responsibility for monitoring outcomes.



For many years the challenge in implementing the development of a DGH and regional centre masterplan has been the lack of HDU/ITU bed capacity, but the increase mandated by the Covid-19 pandemic provides new opportunities. Additional ITU capacity is likely to be maintained to deal with a future ‘surge’ in Covid-19 cases and could be deployed for severe liver disease in the periods when there is less Covid-19 requirement. This will be dependent on how ~~Emergency Departments (EDs)~~ are reshaped ~~to be able~~ to deal with continuing Covid-19 infected patients and ~~the usual mix of other~~ emergency presentations. Crowding in busy EDs and prevention of Covid-19 spread are fundamentally incompatible, particularly with the additional issue of ongoing staff vacancies (2500 consultants and 4000 nurses).

Whether a referral originates from the ED, primary care or another hospital department, a standardised protocol needs to be agreed for sick liver patients requiring ICU admission. Those fulfilling the criteria for ICU care will need to be transferred to the regional centre ~~if initially admitted to a DGH,~~ in a timely fashion and usually within 24 hours. ‘Smart ambulance’ technology, effectively deployed for the management of strokes and heart attacks where outcomes have been greatly improved by specialist centres, ~~needs~~ to be developed to ensure that wherever possible patients are admitted immediately to ~~the regional units~~ where ~~early~~ specialist care can be delivered. Weekly MDTs, ~~for example~~ by video platform, ~~it is recommended~~ should be part of establishing better communication and dialogue ~~over care pathways and outcomes~~ between DGH and regional centres.

Improving hospital outcomes for patients with severe liver disease requires in addition new measures to circumvent/avoid early, unplanned re-admissions of those with decompensated cirrhosis, the commonest factors being recurrent ascites, hepatic encephalopathy and alcohol dependency(26). In one study a scheduled outpatient visit at Day 7 post-discharge to

optimise further outpatient care was shown to reduce hospital readmissions and emergency department attendances(27). The visit should ensure patients with cirrhosis/severe fibrosis are entered into a surveillance programme for early detection of hepatocellular carcinoma (HCC), with the steadily rising death rates for this complication.

### **Improving Outcomes of Childhood Liver Disease**

Late diagnosis of neonatal liver disease remains the main cause of chronic liver disease, necessitating liver transplantation(28). In Taiwan and in Canada, the use of stool colour charts has effectively abolished late presentation of biliary atresia. This has led to a with-a significant fall in mortality and a reduction in the numbers and cost of early transplants by ensuring surgery took place before 90 days (29-31). The inclusion of a stool colour chart in the Personal Child Health Record (PCHR, the ‘Red Book’), which is given to all parents, would alert health visitors to refer infants for measurement of conjugated bilirubin level in blood to confirm the diagnosis. ~~The impact of liver disease on the developing brain in infants and children also needs to be addressed.~~ Deficits in all areas of neurodevelopment, including cognitive, behavioural and motor development, are described and up to 42% of children post liver transplantation have additional educational needs(30, 31). Similar to NICE guidance for children born preterm, those with liver disease require enhanced developmental surveillance including formal assessments by a multidisciplinary team of health professionals at set times during infancy and longer-term (32)(NICE guideline 13). Collaboration with educational psychologists will be important in achieving the goal of “meaningful survival” (~~42~~11).

The high prevalence of non-adherence to treatment - particularly following transplantation – has also highlighted the need for dedicated specialist care during the period of transition from paediatric to adult services, with the appointment of a dedicated young person’s champion in

each centre. In a National Survey, out of 18/26 secondary/tertiary adult liver centres ~~whiche~~ responded to an online questionnaire, 50% only had a liver transition service(33). In these centres, young adults were more likely to have adequate knowledge about their condition, better adherence to treatment, and were less dependent on the paediatric provider.

### **Alcohol Care Teams in Integration of Alcohol and Liver Care**

Around 30% of wholly alcohol-~~attributable~~ admissions are due to ARLD(34) and it is important that ACTs have close links with acute medical services (Hepatology) to ensure expert care of ~~both~~ alcohol addiction ~~in these patients~~ as well as ~~of their~~ liver disease ~~in these patients~~. It is estimated that one in 10 patients in acute hospitals are alcohol dependent, and a further 20% are harmful drinkers(~~435~~). The key components of effective ACTs include a clinician-led multidisciplinary team, a 7-day alcohol specialist nurse service ~~(ASN)~~, integrated addiction and liaison psychiatry services, and medical consultants with expertise in liver disease(~~3536~~). A Quality, Innovation, Productivity and Prevention (QIPP) case study published by NHS Evidence and NICE in 2016~~,~~ describes how ACTs have been shown to significantly reduce avoidable bed days and readmissions(~~3637~~). Modelling suggests that an ACT in a non-specialist acute hospital will save 254,000 bed days and 78,000 admissions annually by year three~~,~~ with a cost saving of £3~~,-~~85 for each £1 invested by year one of full optimisation(36).

In spite of this evidence and numerous reports recommending national roll-out of ACTs, a full implementation has not been achieved due in part to a lack of priority in term sof policy and commissioning, a lack of clarity as to whether ACTs should be funded by the NHS or local authorities (which took over responsibility for commissioning alcohol treatment

services following the Health and Social Care Act of 2012), and simultaneously widespread cuts to the Public Health Grant to local authorities (see below).

In 2019, The NHS Long Term Plan for England(3738) aimed to expand the capacity of ACTs and identified the CCGs' health inequalities funding supplement as a legitimate source of funding(3738). The following year, NHS England & NHS Improvement (NHSE&I) and PHE published a core service descriptor for ACTs with national funding planned for additional or improved ACT services in areas of high prevalence of alcohol dependence(3839). The need for this programme to be implemented remains a priority, particularly with the increase in high risk drinking during the Covid-19 pandemic(3940). There also needs to be a greater focus on improving the clinical competencies of staff working in ACTs and hepatology, with appropriate training programmes(40).

#### *Alcohol assertive outreach treatment*

Frequent attenders to hospital for alcohol-related reasons place a disproportionate burden on the NHS, accounting for 59% of all alcohol-attributable admissions. Clustered in areas of high deprivation (correlation  $r=0.74$ )(41), they often do not engage with community addiction services and many have ARLD, as well as untreated mental health co-morbidities. Alcohol Assertive Outreach Treatment (AAOT) involving assertive engagement and intensive case management has been shown to reduce re-hospitalisation by up to 50%(4442). The 2017 national survey in England identified 37 acute NHS trusts (24%) providing elements of AAOT(4243). However, only 6 of these services (16%) provided all 6 components of effective AAOT, and the majority lacked a multidisciplinary team provision and/or were not resourced sufficiently. Implementation of AAOT has been hampered by the same policy and funding barriers identified for ACTs.

A service evaluation of AAOT in South London in 2018 showed that compared to standard care, AAOT saved £13,548 per patient in the first year in reduced inpatient bed days alone. Less the cost of intervention of £2,979 per patient, this provides a net short-term cost saving of £10,569(421). If AAOT was rolled-out nationally in England to the estimated 54,369 alcohol-related frequent hospital attenders, estimated savings of £575 million could be achieved within a year with an implementation cost of £161 million, or a return of investment of £3.42 for each £1 spent(442).

#### *Specialist Community Alcohol Treatment*

The success of hospital-based alcohol care is crucially dependent upon a continuing care pathway in the community. The 18% (£162 million) cut to the funding for Local Authority community addictions services in England, has led to a 22% reduction in the number of people entering specialist alcohol treatment. In 2018/19, 82% of people with alcohol dependence in England did not access specialist alcohol treatment. Specialist NHS addiction consultants have been reduced by 48%, with a 60% reduction in the number of specialist addiction trainees in the last 10 years(421). Table 1 shows, for the four nations of the UK, the specialist alcohol treatment access ratios ie the number of alcohol use disorder (ICD-10 F10) admissions to NHS hospitals relative to the number of people accessing alcohol treatment in a given year. Between 2016/17 and 2018/19, the ratios have remained relatively stable in Scotland and Wales, but have increased in England and Northern Ireland, which now have approximately a third and a fifth of the level of access in Scotland, respectively.

This means that community-based specialist alcohol treatment services in England and

Northern Ireland are increasingly ill-equipped to respond to the prevailing level of need in the community, including the aftercare needs of patients discharged from hospital with ARLD.

**Table 1: Specialist alcohol treatment access ratios across the United Kingdom in 2018/19 compared to 2017/18 and 2016/17**

Country	Number accessing treatment for alcohol only in 2018/19 <sup>1</sup>	Number of F10 alcohol hospital admissions in 2018/19 <sup>2</sup>	Treatment access ratio (F10 admissions/ treatment access) 2018/19 <sup>3</sup>	Treatment access ratio (F10 admissions/ treatment access) 2017/18 <sup>3</sup>	Treatment access ratio (F10 admissions/ treatment access) 2016/17 <sup>3</sup>
Scotland	26,536	27,474	1.0	1.0	1.1
Wales	8,344	12,266	1.5	1.5	1.5
England	75,555	220,731	2.9	2.6	2.4
Northern Ireland	2,560	12,548	4.9	3.9	3.9
<b>United Kingdom</b>	<b>112,995</b>	<b>273,019</b>	<b>2.4</b>	<b>2.2</b>	<b>2.1</b>

<sup>1</sup>Excludes concurrent drug misuse as a reason for treatment.

<sup>2</sup>Primary or secondary diagnosis of ICD\*10 F10 'Mental and Behavioural Disorders due to Use of Alcohol'. This is a proxy measure of the prevalence of alcohol dependence in the general population(43). (\* International Statistical Classification of Diseases and Related Health Problems)

<sup>3</sup>The treatment access ratio is the number of F10 admissions to NHS hospitals divided by the number of people accessing specialist alcohol treatment. The lower the ratio the more favourable the level of access to treatment

### **Early Detection of Liver Disease in Primary Care and High-Risk Groups**

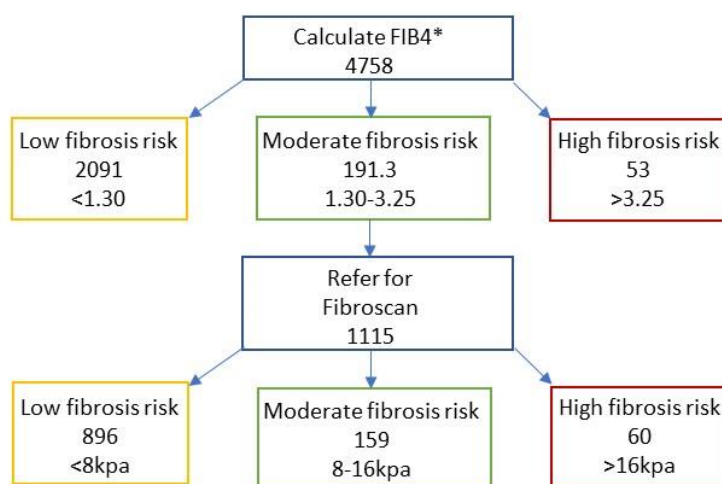
Early identification and management of liver disease is an essential pre-requisite to improving outcomes and avoiding complications of both NAFLD and ARLD. Primary care plays a pivotal role in identifying patients who are at risk and should be central to case

finding and initial interventions, although it remains a challenge to mobilise primary care at scale to take a more proactive role, given other perceived priorities. Nevertheless, the Covid-19 pandemic has had the unexpected effect of accelerating utilisation of digital solutions and pathways in primary care and the interface with hospital care. This has the potential to transform care by allowing for better and more consistent early identification of people at risk of developing liver disease as well as better management and follow up of people with established disease. Examples of excellent practice already exist but these tend to be in pockets and need to be widely replicated throughout the country. Evidence suggests that introducing a two-tier system to screen patients in primary care for liver fibrosis is the most cost effective strategy<sup>(4445)</sup>. This comprises an initial simple screening test with a high negative predictive value (eg FIB-4 or NAFLD Fibrosis Score, NFS) with a second test reserved for detecting advanced fibrosis in those with a high or indeterminate score. Examples of second line tests with suitable accuracy include the Enhanced Liver Fibrosis (ELF) blood test, the Acoustic Radiation Force Impulse (ARFI) technique, and transient elastography (FibroScan), of which a detailed Medtech Innovation Briefing from the National Institute for Health and Care Excellence has been very recently published<sup>(4546)</sup>.

An integrated primary-secondary care pathway was established by hepatologists in Portsmouth in 2014, for assessing and managing patients with NAFLD across three CCGs with a combined adult population of over 650,000. If the NFS indicated low risk, patients stayed in primary care and were issued with standardised advice regarding cardiovascular risk factors and weight management. ~~Higher, with high~~ risk patients ~~being were~~ referred directly to a hepatology consultant clinic for ~~consideration of liver biopsy or clinical trials~~further management. Those with an indeterminate range were seen in a dedicated nurse-led NAFLD clinic which included performance of a FibroScan, with the patients returned to primary care

if the FibroScan reading is <7.9 kPa or referred on to a consultant if 8.0 kPa or higher. An ~~initial~~ evaluation of the first 900 patients seen in the nurse-led NAFLD clinic showed that 70% could be discharged to primary care on the first visit(46). Similarly, in a North London population, improvements in fibrosis detection and quality of referrals were seen using a two-step algorithm of FIB-4 followed by ELF. The pathway led to a four-fold improvement in detecting advanced fibrosis and an 88% reduction in unnecessary referrals(44).

**Mid-Hampshire Fibroscan Project – One Year Pilot**  
**18 participating GP surgeries: high risk groups – diabetes, BMI, alcohol consumption assessed**



**Figure 3: The Mid-Hampshire FibroScan project**

The availability of a more portable mini FibroScan machine has allowed greater accessibility in GP surgeries and community centres. The results of an ~~unpublished~~ pilot study initiated in early 2019 in the Mid-Hampshire CCG (Figure 3) have led to a better calibration of the high-risk category referred to hospital (~~personal communication from consultant gastroenterologist~~



~~Dr Harriet Gordon~~). This pilot was the first to make Fibroscan available for GPs to use directly and in primary care. The costs are £24 per scan in the community, and the potential savings from early diagnosis are clear. Prevention of progression to liver cirrhosis and ultimately transplant represents a saving of at least £12,000 per patients, with an ICU bed priced at £1328/day and a general hospital bed at £195/day. The mid-Hampshire pilot of 1115 scans in 2019 cost £26,760, or equivalent to 20 ICU days. Also, the cost with a Band two nurse is far less than for the usual consultant radiologist delivered service in hospital(personal communication, Dr Harriet Gordon).

Most approaches to early diagnosis have been based on abnormal liver enzymes as the entry point to a liver diagnostic pathway, whereas the Scarred Liver Project in Nottinghamshire uses identification of risk (obesity, diabetes and alcohol excess) as the primary trigger for investigation ~~and primary care requested~~including FibroScan examination. In four Nottinghamshire CCGs (700,000 population) over 12 months, of the 968 patients attending, 222 (22.9%) patients had an elevated liver stiffness ( $\geq 8$ kPa) and in 60 (27.0%) liver stiffness was indicative of advanced chronic liver disease. If a traditional approach based on raised liver enzymes had been followed, 398.7% of those with significant liver disease ( $\geq 8$ kPa) would have gone undetected(47).

The development of electronic medical records (EMR) in the majority of mainstream primary care offers significant and untapped opportunities for identification of patients at risk. Various algorithms are in development that could identify such cohorts directly from their electronic records. Once identified, these can be directed for onward referral utilising automated digital referral processes. In addition, clinical decision support can also be deployed within the EMR to assist practitioners in their management of patients along

appropriate pathways, further accelerating the referral process and improving outcomes. The opportunities based on digital modalities, to deploy a national co-ordinated response to prevention and intervention in those with risk factors for liver disease, integrated within the current mandated Healthcheck, should be a matter of national priority. Primary care would still need to remain engaged in the care of the patients through well designed notification processes and GPs would retain the ability to intervene in the pathway where appropriate, given their knowledge of the patients and their families. The administrative burden of follow up for these patients could also be simplified using automated call and recall systems.

ARLD generates even greater challenges around early detection as there is significant under reporting of alcohol use within medical records. This may well lessen the potential of algorithmic digital approaches to case finding which is further compounded by the greater proportion of patients who do not proceed to investigation or treatment. However, there are other routes for detection of heavy drinkers, for example through drink driving or domestic violence records. A more consistent coordinated multidisciplinary community and hospital approach is needed to increase the likelihood that patients and their families get the treatment they require and improve outcomes to this major cause of preventable deaths. ,and importantly removal of the current disconnect in funding.

## **Hospital Plans in Scotland, Wales and Northern Ireland**

### ***Scotland***

The latest figures for the MUP policy for alcohol show that in the year following its introduction, cider consumption fell by 18.6%, in contrast to England & Wales where it rose by 8.2%(4849). and confirmings a sdnet reduction of 4-5% in adult off-sales already referred to. In the financial year 2018-19, which includes 10 months post-MUP, the European Age-

Sex Standardised Rates (EASR) for hospital stays due to ARLD fell ~~to 129.3~~ from 139.9 in 2017-18 to 129.3, having been rising or static for each of the previous five years<sup>(4950)</sup>. The longstanding and recurring staff shortages facing DGHs is of concern, ~~and the present arrangement of gastroenterologists with a liver interest having to contribute to acute take hampers recruitment and retention and, as in England, needs to be reconsidered.~~ Few Health Boards have formal ACTs.

Pre-symptomatic diagnosis of liver disease relies on the opportunistic detection of abnormal LFTs, for which various pathways are employed to aid diagnosis and staging. Intelligent Liver Function Tests (iLFTs), the automated analysis and interpretation of abnormal LFTs in primary care developed and piloted in Tayside<sup>(5051)</sup>, improves the efficiency of diagnosis and work is currently underway to extend/adapt iLFTs in other Health Boards. As many patients, even with advanced liver disease, have normal LFTs<sup>(4748)</sup>, an additional approach to pre-symptomatic diagnosis is necessary, based on the use of liver fibrosis markers, including FIB-4 score. The potential target in Scotland is the 40,000 at risk drinkers in primary care identified annually by the national Alcohol Brief Intervention (ABI) programme<sup>(5152)</sup>. A pilot project in Edinburgh demonstrated that FibroScan use in an alcohol treatment setting is feasible and worthwhile<sup>(5253)</sup> and, as in England, the systematic use of liver fibrosis markers and FibroScans in high risk groups is being strongly recommended.

### ***Wales***

The Gwent Liver Unit was commissioned to undertake a pilot study of routine testing for the reflex AST liver enzyme testing and referral for FibroScan if the AST:ALT ratio is >1. In two years, 18,000 people were risk assessed and 192 identified with advanced fibrosis, with the

coded diagnoses of cirrhosis increasing by 81% (unpublished data. Personal communication Andrew Yeoman). This pilot has formed the backbone of a new Welsh national liver blood test pathway, incorporating assertive fibrosis testing being launched in summer 2020. A free, comprehensive, online education resource has been produced for all primary care clinicians in Wales to improve understanding of liver blood test assessment, rationale for fibrosis testing and management of risk factors. The Wales Liver Plan is also funding a ~~band three~~ Liver Disease Support Worker in each Health Board for two years to increase FibroScan capacity, take testing into the community and, in future, extend testing to those with NAFLD and alcohol misuse.

A national ACT working group has been convened to engage with the Values Based Healthcare framework in producing a “Benefits Realisation” report for the Chief Medical Officer (CMO) and which will complement the impact of the introduction of MUP in Wales which came into force on 2<sup>nd</sup> March 2020. Finally, a Welsh Parliament Cross Party Working Group has been convened to focus on engagement with politicians and to drive progress in the three key areas aligned to the Lancet Commission priorities of hospital care, alcohol care teams and early detection.

### ***Northern Ireland***

Consultant-led ACTs are in place in three of the five trusts in Northern Ireland. The remaining two trusts have lost their alcohol specialist nurse (ASN) posts as a result of the implementation by the Department of Health of the Rapid Assessment, Interface and Discharge (RAID) model of liaison psychiatry services. ~~M, with many ASNs were not~~ suitable for redeployment as RAID practitioners ~~due to their lack of~~because they had no

formal mental health training ~~but the~~—The aim is to create ACTs in all Trusts, along with prioritising and protecting valuable ASN services.

Data from 2016/17 to 2018/19 show that in the 20% most deprived areas, the standardised alcohol related admission rate was four times that in the 20% least deprived areas (1,410 and 353 admissions per 100,000 population respectively)(~~53~~54). In addition, the alcohol specific standardized death rate was more than four times higher (31.7 and 7.6 deaths per 100,000 population, respectively)(~~53~~54). Targeted intervention in the deprived areas is required, the data strengthening the call for the introduction of MUP which was delayed by the suspension of the devolved government assembly for three years until January 2020, and which is now being considered as part of a new substance misuse strategy. The results show alcohol harm remains a serious health inequality.

#### **Conclusions:**

Implementation of the main recommendations detailed in this report of the Lancet Commission should result in improved outcomes and survival rates for both chronically and acutely sick liver patients requiring admission to hospital. The comprehensive masterplan described incorporates better expertise in all acute hospitals, with Lead and Deputy Lead positions providing 24/7 emergency cover, along with active links to 30 specialist regional centres. As well as ensuring better cover for deprived areas, it represents an integrated, high quality service which can work alongside the likely reconfiguration of hospitals and particularly HDU and ITU facilities consequent on the Covid-19 pandemic. Fully staffed ACTs in every hospital dealing with liver patients will also aid in the care of the commonest group of admissions, namely those with ~~alcohol related liver disease~~ARLD. Close links with the hospitals liver services will be essential and there also need to be joint follow-up

arrangements between ACTs and hepatologists for patients after discharge from hospital, to reduce the current high readmission rates. The Commission strongly recommends that cuts in ~~Cuts in~~ addition specialist posts should be reversed, ~~the Commission recommends,~~ so that AAOTs can be ~~set-up~~ established to maintain long-term care outside the hospital, with substantial financial savings to the NHS. Implementation of ACT programmes with connection to hospital liver services in all hospitals would deliver an average net saving of £448,000 for an implementation cost of £157,000 per hospital in the first year. Development of AAOTs to reduce pressure created by repeat attenders and their implementation on a national level, would cost £161m but release savings to the NHS of £575m (41).

Studies showing the value of the transient elastography (FibroScan) technique in detection of severe fibrosis/cirrhosis in asymptomatic individuals in primary care, are the basis for a strong recommendation that this technique should be widely implemented throughout the UK. The importance of each CCG having a diagnostic care pathway in place cannot be over emphasised. Assessment of alcohol consumption, as mandated in the adult Healthcheck carried out in primary care, needs to be properly recorded ~~to facilitate~~ ing the greater use of ~~Minimal-~~ Interventions of proven benefit. The potential value of digital technology in improving consultations in general practice, which has come to the fore during recent Covid-19 experience ~~and -~~ increased the involvement ing the involvement of patients in their own care pathways, is also detailed and strongly recommended in the report.

Finally, the importance of tackling public health hazards of obesity and diabetes in reducing the burden of liver disease in the UK is further strengthened by the striking effects of such co-morbidity on the mortality of Covid-19 infection, especially given-with the possibility of further waves of the infection. It is only by a comprehensive public health approach,

including the long overlooked alcohol strategy, that Westminster Government can turn the tide of liver deaths, particularly in young people of working age. An extension of the levy on sugar content in drinks to foodstuffs should be part, the Commission strongly recommends, of the more active measures now being considered by Government. The further evidence internationally of the effectiveness of MUP, along with latest results from Scotland given in the report, add to an unassailable case for its urgent implementation, as well as the proper labelling of alcohol products to include calorie content and health warnings. The need to address deficiencies in the liver plans of the devolved nations similar to those in England is highlighted and the box summary of main recommendations includes measures to improve long-term outcomes in children with liver disease.

#### **Box 1: Summary of main recommendations**

<b>1</b>	Establishing a Lead and Deputy Liver Lead in each acute hospital, to <del>have-take</del> responsibility for 24/7 care of acute admissions <u>and</u> closely linked to <u>one of</u> 30 regional <del>centres with</del> hubs. <u>These regional centres require</u> HDU/ITU capacity and facilities for specialist treatment. <del>Increase in number of training posts in Hepatology.</del>
<b>2</b>	<u>Increase the number of training posts in Hepatology. Currently hospital are advertising funded posts but there are insufficient trainees to fill them, leading to higher staff costs for locum posts. There is also urgent need to reverse the fall in training posts in addiction psychiatry.</u>
<b>3</b>	<u>Extend 7-day alcohol care teams to all acute hospitals, with appropriate links to liver services.</u>
<b>42</b>	<del>Implementation of ACT programme with connection to hospital liver</del>

	<del>services.</del> <u>Utilise aggressive outreach services in the community to support frequent hospital development of Assertive Outreach Clinics to reduce pressure created by repeat-attenders with alcohol use disorders. Implement MUP</u> <del>Reverse the decline of alcohol treatment services.</del>
<del>35</del>	Expand <u>primary care</u> access to FibroScan for detection of severe <del>F</del> <u>Fibrosis/cirrhosis</u> in asymptomatic individuals within high risk groups. Assess liver health as part of the adult HealthCheck.
<del>64</del>	<u>Prioritise public health by extending soft drinks levy to foods, introduce meaningful alcohol labelling and intensify Government recommendations on physical activity to reduce levels of obesity and diabetes. Extend the soft drinks industry levy to food-stuffs and intensify Government recommendations on physical activity to reduce levels of obesity and diabetes.</u>
<del>57</del>	Facilitate translation of best practice across and between health systems of the four nations
<del>68</del>	Increase survival and improve outcomes for young people through earlier diagnosis of biliary atresia <u>by adopting stool colour charts as part of neonatal screening and</u> <del>and</del> enhanced neurocognitive developmental surveillance

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RW was responsible for planning and providing content for the Executive Summary, Introduction and Conclusion, and writing, editing and overall direction of the paper. ND was responsible for coordinating content and editing. HR, NB, RW, RP, RB, MA contributed to the section on Covid-19; GF, HG, RA, DT, MA, JF, RG, ZM, JW, SR, JV contributed to the section on the Hospital Services Masterplan; AD, DK, MS contributed to the section on Paediatric Liver Disease; CD, KM, NS, IG, KS, CH contributed to the sections on Alcohol Services; CA, HG, SR, RA contributed to the section on Primary Care; AY, NM, AM, RM, contributed to the sections on the devolved nations. IG took over role of corresponding author in August 2020 following the untimely death of Professor Roger Williams.

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Ref 6 and 10: data in these reports is derived from the ICNARC Case Mix Programme Database. The Case Mix Programme is the national clinical audit of patient outcomes from adult critical care coordinated by the Intensive Care National Audit & Research Centre (ICNARC).

**Reviewer #1:** This is another report from the Lancet Liver Commission and makes a number of recommendations. I have a few comments:

It would be helpful if the key recommendations were indicated as bullet points in the Summary

The authors have attempted to be as concise as possible and have been very aware of word count issues, hence inclusion only in the Conclusions

Can the authors include data showing that the introduction of MUP for alcohol is associated with a reduction in deaths from ARLD and other alcohol-related deaths?

In Scotland, death data is reported by the National Records for Scotland. The latest figures available are for the calendar year 2018, published in June 2019. The 2019 figures have been delayed (presumably because the NRS are too busy with Covid). The 2018 figures, which include 4 months pre-MUP and only 8 months post-MUP, were reported in last year's Lancet Commission (reference 85 in Lancet VI) and hence not included again in this year's report.

The most up to date data available on health effects is for hospital stays (i.e. morbidity rather than mortality) for the financial year 2018-19, published by Public Health Scotland (formerly ISD). That is included in this year's Lancet Commission report, reference 50. The only other new publication is a refinement on the sales data according to the type of product. That as expected shows dramatically different trends for sales of cider in Scotland and England and has also been included in this year's Lancet paper (reference 48).

The authors share the reviewer's frustration on the paucity of post-MUP data.

It should be recognised that the Scottish Government introduced other measures to help reduce alcohol consumption and that death rates from alcohol in Scotland have been falling since 2012.

The reviewer is incorrect in this statement about the death rates from alcohol falling in Scotland since 2012. They fell from a peak in 2006 until 2012 since when they had been rising until 2018.

In the discussions of manpower. are the authors referring to the number of consultants or wte?

This is headcount not WTE

The Table of Recommendations is very helpful: can the authors add a column indicating which organisation would be responsible.

The authors have considered this but do not feel it would add clarity as the recommendations would require multi-party action in most cases

Could the authors give more indication of the costs and savings of their recommendations.

The authors have inserted data where available. See Box 1, recommendation 1 and 2 and also page 11, lines 41-45

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**Reviewer #2:** This report follows a succession of Lancet Commissions and points to a high mortality of acute liver admissions - higher than acceptable. The report adequately elaborates the need for

- 1) Integrated clinical services
- 2) Sketches out a master plan: Based on geographically sited hub centres linked to DGH's
- 3) Intensive care access
- 4) Alcohol care teams
- 5) Paediatric liver services

The report is not short on pointers to failings and offers requisite specifications, but is short on an evaluation of successful measures that should have been implemented and that are needed to prevent ongoing current failings. These could persist or be aggravated in a post Covid-19 world (although there is likely to be the increased focus on obesity and metabolic liver disease)

The authors have highlighted measures to address ongoing failings, particularly in relation to Alcohol Related Liver Disease (ARLD). For example, the successful initiative to address variation in mortality between hospitals treating ARLD in North West England has recently been evaluated. A sentence has been inserted (p6 line 26-28) to mention this in the section on hospital care. In addition, there is abundant clinical and cost effectiveness data for the role of hospital Alcohol Care Teams described in K Moriarty's paper, ref 36.

1) The authors suggestions will require new positions, fuller staffing and active links- feasible?

See p5, lines 46-51 and p6, lines 1-7

2) There is frequent mention of digital solutions and pathways but the manuscript is short on specifics: Digital data collection? Digital algorithms? Telemedicine consultations?

The authors intention in this paper was to outline potential opportunities, achievable with minimal resources, rather than to design a specific pathway recommended for implementation

3) Primary care: Fibroscan: how widespread is the use of this technology in general practice currently?

This has been addressed on p11, lines 41-45.

The authors believe that the MidHampshire Pilot was the first use of fibroscan that was available for GPs to use directly and actually in primary care. Locally Southampton CCG have now also undertaken this. The authors are not aware of more widespread use in general practice at the current time

4) Long delayed measures to reduce obesity, minimum pricing policy alcohol consumption may improve with recent emphasis

See additions to text p5, lines 13-15, and p13, lines 42-51

The reality is that several Lancet commissions later why is the "situation little different", (as the authors state) with case fatality rates unchanged from that seen in 2012" Why is the population mortality rate for liver disease in people younger than 65 rising, several Lancet Commissions later? Why are the numbers of hepatologist still low and 50% of advertised posts unfilled?

This has been addressed on p5, lines 46-51, and p6, lines 1-7

The recommended masterplan is offered as a solution but the reality of offering a hepatologist well versed in the management of acute liver conditions in 191 hospitals is questionable and will be reliant of hub and spoke services? Will staff vacancies allow the current maintenance of ITU beds: Covid-19 was a special situation that laid bare the 2500 consultant and 4000 nurse vacancies.

We address this concern in the manuscript. On page 5 line 43, we state: " This cannot be achieved by creating a specialist hepatology service in every hospital, nor by transferring every unwell liver patient to a specialist referral centre.". Instead, we propose that a Liver Lead clinician be designated in each acute hospital (achievable in most cases from the existing workforce) and by building network links with specialist centres.

The second comment on workforce requirements to staff the extra ITU beds post-COVID-19, is a valid question. However, at a national level, some of these workforce concerns were highlighted in Simon Stevens' recent letter to NHS Trust Chief Executives:

<https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/04/second-phase-of-nhs-response-to-covid-19-letter-to-chief-execs-29-april-2020.pdf>

It is expected that NHS organisations will retain "surge capacity" for the foreseeable future.

Improving outcomes childhood liver disease: Surely the inclusion of a stool colour chart to facilitate early recognition of biliary atresia is the easiest recommendation to apply?

See page 1, line 12 and also Box 1

Alcohol care teams:

The recommendations made are practical and in use in specialist centres. The challenge indeed is to implement these in non-specialist acute hospitals. Why has this been delayed despite the numerous recommendations, and publications that precede this manuscript? Again, why the failure to build sufficient assertive outreach programs?

The authors attribute this failure to funding issues and this has been referred to in several places in the text

Specialist community alcohol treatment - here the cuts in services can be incriminated, with a consequent decline in services.

See additions p8 lines 32-33, and p9 lines 2-5

Early detection liver disease: Suggests shift to primary care but this will require extensive GP education.

The authors have correctly pointed to the Covid-19 pandemic resulting in the introduction of new technologies. Have hepatologist clamoured to link services to early detection of liver disease or piggy back diagnostic tests for hepatitis- could this be seen as a wasted opportunity? The suggestions place responsibility on primary care GP's or Public Health agencies in the four nations. Are they up for this and do they have the resources for such a policy. Or would there be a fear of disruption of other prioritized public health measures?

The authors note the points made here. The overarching issues are diversity in policy and implementation across the 4 nations and funding. In England, the Royal College of GPs is increasing its online training materials for GPs and the authors welcome initiatives such as this.

Minor points:

Would the authors suggest the cut off of  $< 1.3$  for a FIB-4 score that would have the necessary high negative predictive value?

The authors would agree that a cut-off of  $< 1.3$  for a FIB-4 score is a very good negative predictor (see McPherson S et al Am J Gastro 2016) and this is used in the manuscript's figure.

Could more be made of telemedicine and ECHO programs to integrate and combine care?

As indicated above, there is considerable potential for development here but the authors intention in this paper was to outline potential opportunities, achievable with minimal resources, rather than to design a specific pathway recommended for implementation.

**Reviewer #3:** This report addresses the issue of high mortality following admission to UK hospitals for acute liver-related disease. In general, they have based their analysis on the activity of regional liver centres, each one linked from four to six surrounding district general hospitals.

The Authors have included the Covid-19 experience in their report as an example of urgent admission to intensive care unit.

They have then dedicated their description to the implementation of the alcohol care teams program and pediatric liver services.

My comments:

1. The section "Co-Morbidity of Covid-19 Infection and Improvement of Public Health" should be reformatted. I would consider the Covid-19 issue in a separate paragraph, rather than including it in this section, which would be dedicated only to "Improvement of Public Health".

1.1 Within the same section "Co-Morbidity of Covid-19 Infection and Improvement of Public Health" the paragraphs in which the Authors discussed on obesity and excess alcohol consumption, its consequences and management should be reported in two separate subchapters in order to facilitate the reading.

2. In general, the Authors should write a separate section entirely dedicated to the impact of Covid-19 on acute liver-related hospital admission in UK. Covid-19 is an exceptional event which contributes to demonstrate whether the public health system is capable to react. We really hope we will not need to face a similar pandemic in the future.

The authors felt it was important to address the Covid-19 issue in the paper but have not expanded further on this as the main focus of the paper was measures to improving hospital outcomes and better detection of disease in primary care.

3. The Authors in the "Masterplan for Improving Survival Rates in Acute Hospitals" section reported this statement from The Chair of the 2013 NCEPOD report. Looking at those who died from Alcohol Related Liver Disease, they commented as follows 'The first thing I found surprising was how many of these extremely ill people were admitted under doctors who claimed no specialist knowledge of their disease, and how many of them were not then seen by an appropriate specialist within a reasonable period. Of course, we knew that there are comparatively few hepatologists in our healthcare system, only 52 of 191 hospitals claimed to have one. But I expected that the others would employ gastroenterologists with a specialist interest. Yet 45 hospitals admitting seriously ill people who were destined to die of liver disease told us that they had neither a hepatologist nor a gastroenterologist with an interest in the subject.'

My impression is that the political description is obvious and superficial and it does not add any relevant background to the next part. I would modify this report and mention only the rate of hospitals with expert hepatologists, which is relevant to compare the improvement of 2020 to that of 2013.

The ongoing recruitment and training issues referred to in the report mean that there is limited improvement to report and the authors felt there was value in revisiting the statement from the 2013 report

3.1 In the same section, it would be very interesting to understand how the UK health system/academic institutions identify hepatologists within gastroenterologists and their different training process (if present). Please describe the system for non-UK readers.

Word count restrictions mean that it is not feasible to include details of the UK training and speciality training process in this report. It is the case that for the last 5 years, around 50% of Physician consultant appointments have been unfilled due to a lack of Physician trainees, and this includes gastroenterology which hepatology trainees derive from. In turn there is a shortage of Core Medical Trainees, and indeed most other specialties. This is problems not just in the UK. Hence the drive to increase the number of UK medical students for the long term, but this will take around 15 years to see an increase in hepatologists.

3.2 The description on how to improve survival rates in acute hospitals represents the main target of the manuscript. I would suggest summarizing the main steps of the process in a box so as to highlight the list of needs in each hospital.

The authors have considered this suggestion and feel that it would not add clarity due to the degree of variation that currently exists

4. The section "Improving Outcomes of Childhood Liver Disease" is not exactly in line where places within the document. I strongly believe the appropriate management of pediatric patients is without any doubt a sign of an appropriate health care system, but this part does not fit properly in the flow of the manuscript. My suggestion is to move it somewhere else and therefore to harmonize the whole text.

The authors did find it difficult to place this section within the overall report but felt the content merited inclusion

5. The section "Alcohol Care Teams in Integration of Alcohol and Liver Care" is very well reported, but it seems mainly based on the admission for alcohol dependence and acute alcohol intoxication. I would add a paragraph on the admission for acute alcoholic hepatitis or for acute decompensation- due to alcohol intake-in patients with chronic alcohol-related liver disease. I believe they represent a large number of admissions in the UK.

Space restrictions have dictated the data chosen for inclusion

5. For the section "Early Detection of Liver Disease in Primary Care and High-Risk Groups paragraph", I would suggest to report the main steps in a box to list the necessary tools to assess and then manage different liver diseases.

The authors approached this section by reporting a number of local area initiatives. Roll out of a uniform system nationwide would be of considerable benefit but is beyond the scope of this report.

6. I believe too much emphasis is given to the fibroscan project. It is fine to cite it, but its description and accessibility within the whole text has to be balanced. The data reported in figure 3 are not cited, if I am not wrong, and it is difficult to fit it into the whole paper.

The Fibroscan is a valuable and easy to use tool in disease detection and the authors believe that more widespread use would be of great benefit.



7. The following is more a question to the Authors than a comment, regarding the section "Hospital Plans in Scotland, Wales and Northern Ireland". This is the UK Commission report. Should the Authors include the specific descriptions from Scotland, Wales and Northern Ireland in the main text? Why 3 separate paragraphs for the 3 Countries? It seems that everything else is reported from England and the three remaining specific activities from the other three Countries. If there is a political reason for that, then it is fine with me, but the first impression as a reader is not that clear.

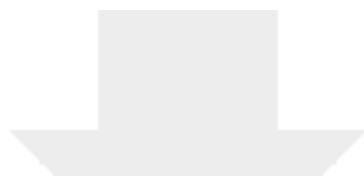
With no uniformity of structure or decision making across the four nations it seemed a more concise approach to update on Scotland, Wales and NI in separate sections

8. General comment: this Lancet Commission is absolutely of value, all the co-Authors are excellent experts on the field. However, in my opinion, and I hope this could be of help and not meant as a criticism, the manuscript needs to be better organized with chapters and sub-chapters as well as title and sub-titles in order to help the reader read more smoothly. I had the perception that some paragraphs were written by different people and then merged together without a uniform style.

If accepted for publication, the Lancet editorial team have extensive input in re-phrasing the text to match the 'house' style

Changes/addition as to text:

Box 1 has been amended and now includes 8 rather than 6 recommendations. Rec 1 has been split into 2 and Rec 3 added.



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**Supplementary Material**

RW main draft 17.6.20 final edit.doc

