Treatment of Alcohol Related Liver Disease (ARLD) at Portsmouth Hospitals NHS Trust

A report for Wessex AHSN ‘Reducing Harm from Alcohol’ Programme

Dr Brad Keogh
Centre for Implementation Science

brad.keogh@soton.ac.uk
@KeoghData

Wessex AHSN alcohol programme clinical leads: Dr Julia Sinclair & Dr Leonie Grellier
Wessex AHSN senior programme manager: Kathy Wallis alcohol@wessexahsn.net

Contents

Key findings

Data from the 6 Acute NHS Trusts in Wessex shows:

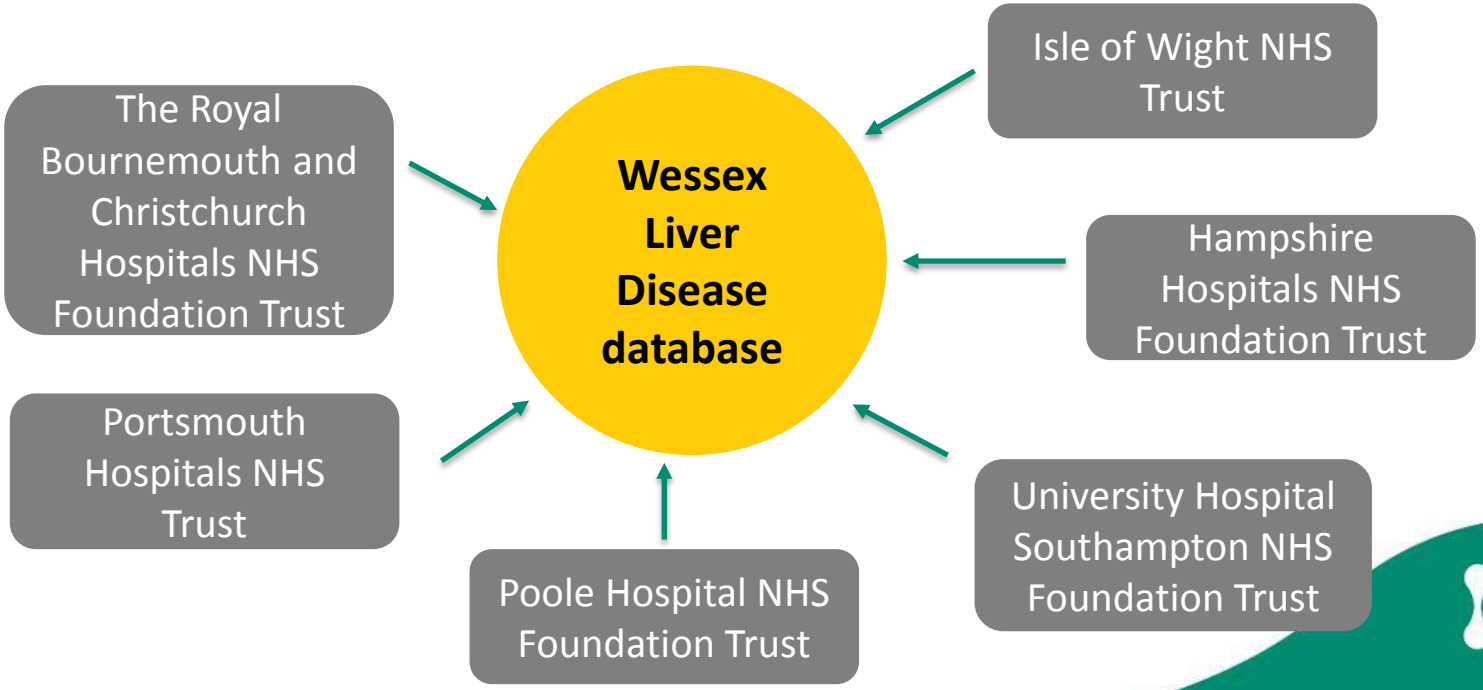
- The number of **Liver Disease admissions** are **increasing** each year
- In 2015: Across Wessex an average of **37% of Liver Disease admissions** were for **alcohol-specific** conditions, this increased to **45%** at one Acute Trust
- **Alcohol Related Liver Disease** (ARLD) **patients** are on average 10 years **younger** and more likely to be **male**
- The **probability of death** for an **ARLD** diagnosed patient 3-years after diagnosis is **45%**, compared with **26%** for a **non-ARLD** patient*
- **ARLD patients** have a **greater number of admissions** and **longer lengths of stay** than other Liver Disease patients
- An **audit** from Hampshire Hospitals Foundation Trust suggests that up to an additional **13%** of Liver Disease admissions have alcohol use disorders but are not coded as such. Further audits are being completed at other Trusts across Wessex
- It is estimated that **improving patient management** in Acute Trust settings could **save *at least* £10m-£13.3m per year**** across the 6 Acute Trusts

* Figures based on Trust recorded data only, hence probability of death may be under-reported here

**Range determined by ARLD diagnosis either 1 or 2 years earlier

Development of regional Wessex acute Liver Disease (LD) database

- 6 Wessex Acute Trusts have contributed admissions data to a regional Wessex database
- The database comprises all LD admissions Jan 2011 – Dec 2015: ~25,000 admission episodes with over 350 data fields for each admission (~9 million elements)
- As well as this report there are individual reports available for other Trusts/CCGs & Wessex



This data does not include:

- **Any** hospital admission where **Liver Disease** is **not coded** (even if present)
- Any admission occurring outside of the 6 Acute Trusts

ARLD and alcohol-specific admissions are under-estimated where:

- Patients have **not been screened** for alcohol
- Patients **screened but not coded** in Trust electronic records
- Patients where ARLD is obscured by obesity-related Liver Disease

Headline numbers: Portsmouth Hospitals NHS Trust

- **During Jan 2011 – Dec 2015**:
  - There were **5,100 LD admissions**
  - There were **2,240 ARLD admissions** (from **1,015 ARLD patients**)
  - **On average** there were ~ **180 new diagnoses** of **ARLD per year**
  - **48 %** of all **LD admissions** had an **alcohol-specific condition** recorded
  - **88 %** of all **LD admissions** were **emergency**

- **Between Jan-Dec 2015**:
  - There were **1,035 LD patients**
    - Who had **1,340 admissions**
    - Of which **517** were **alcohol-specific admissions**
    - There were **339 LD patients** who had at least one admission for an **alcohol-specific** condition
  - Of the LD patients there were **284 patients** diagnosed with **ARLD**
    - Who had **451 admissions**
    - Using over **4,600 bed days**
    - At a PbR cost of over **£ 1,300,000** *

Definitions of admissions:
LD: patient with Liver Disease diagnosis
ARLD: patient with Alcohol-Related Liver Disease diagnosis
Alcohol-specific: admission with ARLD or other alcohol diagnosed conditions
For full definitions see Appendix A

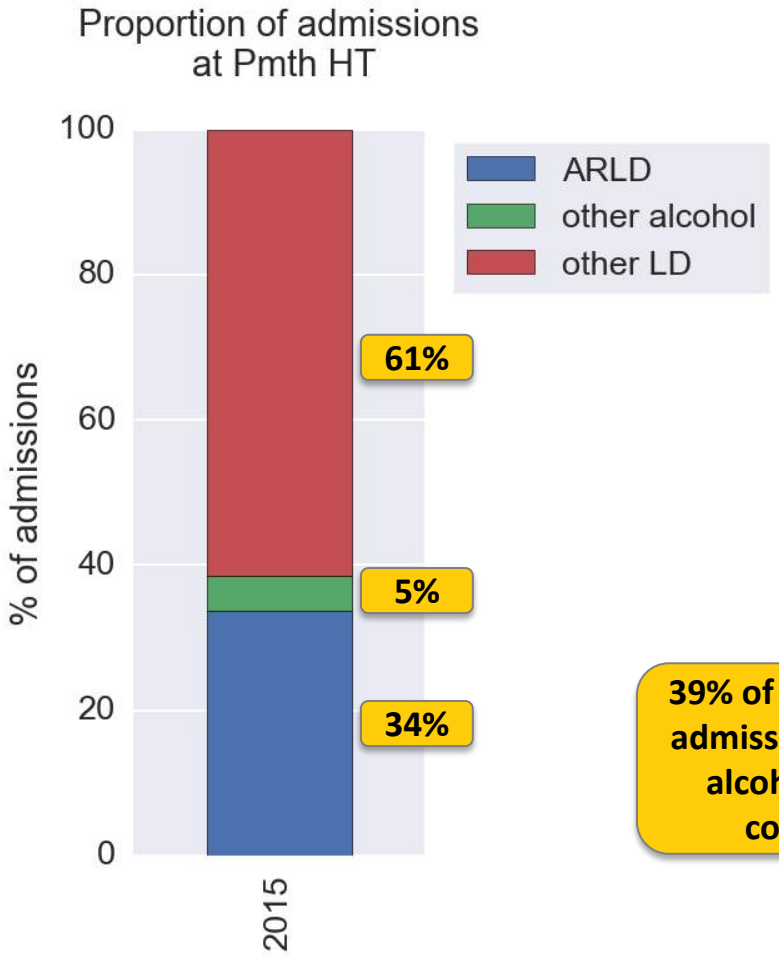
* Cost may be under-reported by up to 10%, as some admissions could not be assigned to a HRG tariff

Proportion of Liver Disease admissions ARLD or alcohol-specific at Trust

Key Narrative

A HHFT audit suggests that up to an additional 13% of Liver Disease admissions have alcohol use disorders but are not coded as such.

Therefore a higher proportion of people in the 'other LD' group could be coded with alcohol-specific conditions if screened and recorded on patient notes appropriately.



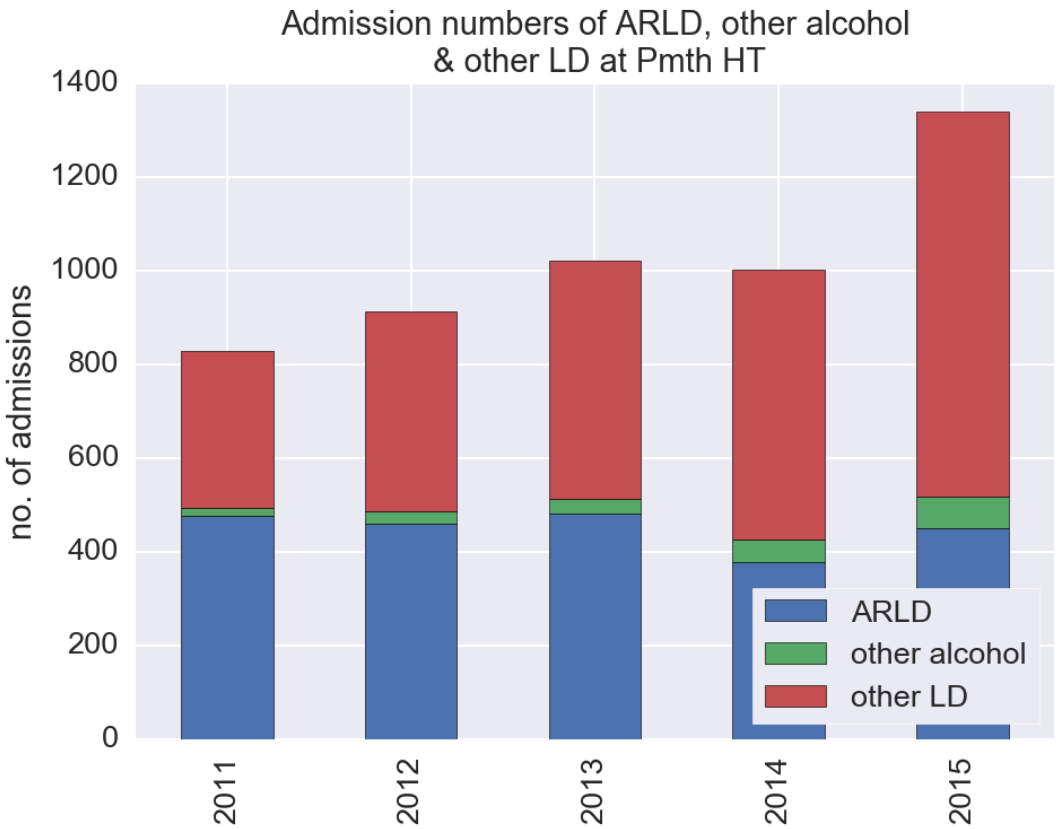
39% of Liver Disease admissions were for alcohol-specific conditions

Numbers of Liver Disease admissions over time at Trust

Key Narrative

The number of Liver Disease admissions are increasing over time.

A HHFT audit suggests that up to an additional 13% of Liver Disease admissions have alcohol use disorders but are not coded as such.



No. of Liver Disease admissions are increasing

Admission coding by Liver Disease code at Trust

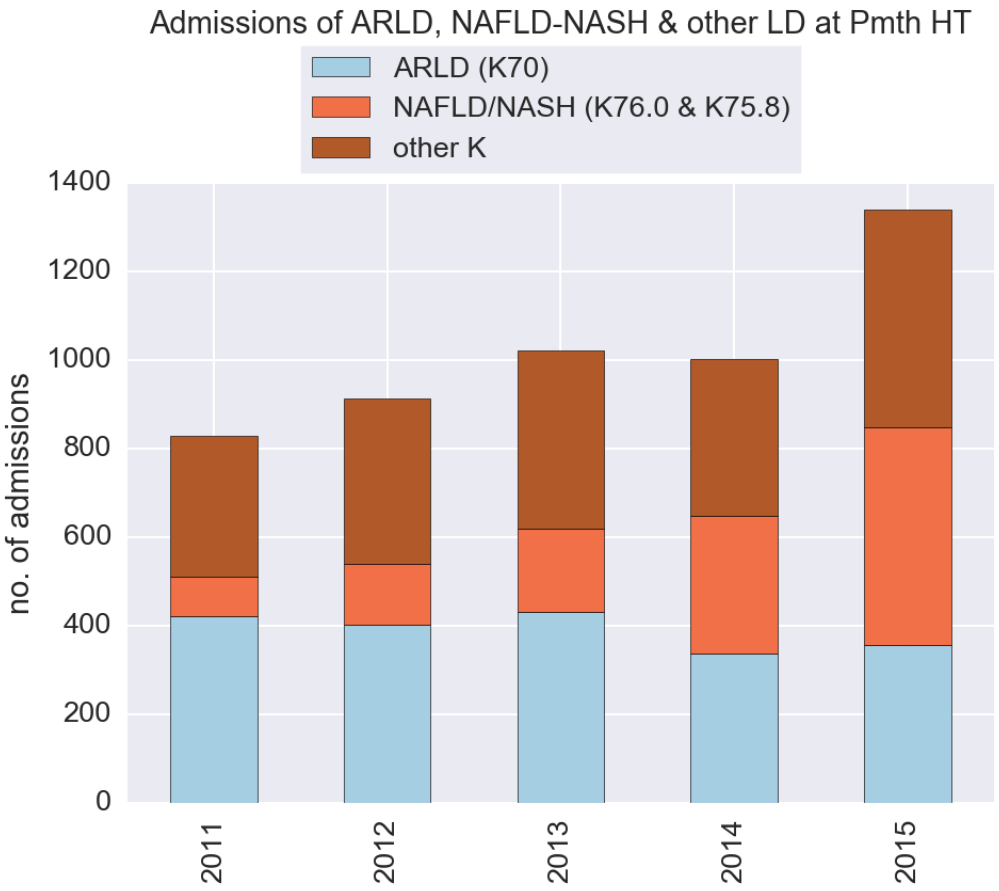
Key Narrative

When considering the final LD diagnosis recorded in the hospital spell:

Between 2011-2015 there has been an increase in 'Non-alcoholic fatty liver disease' (NAFLD) and 'Non-alcoholic steatohepatitis' (NASH) diagnosed admissions.

These changes are most likely to be due to the increase in obesity.

Patients diagnosed with NAFLD are at greater risk of developing ARLD more quickly.

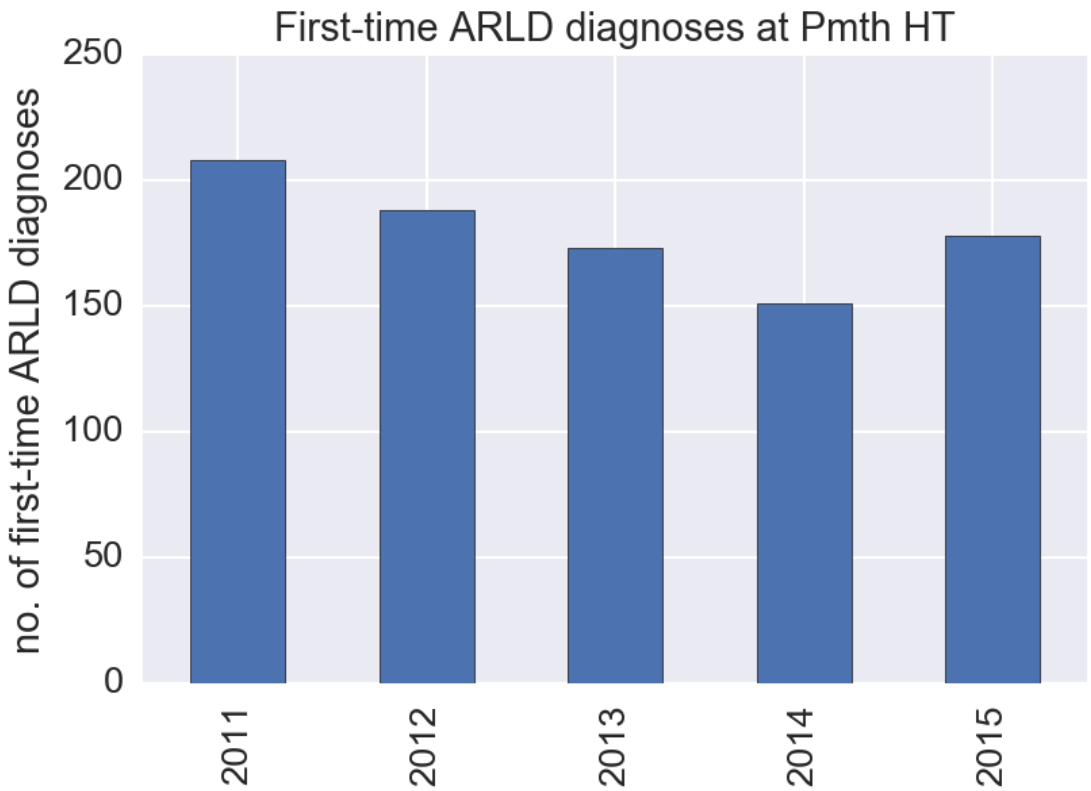


The impact of obesity on Liver Disease admissions

Number of new patient ARLD diagnoses in Trust per year

Key Narrative

The number of first time ARLD diagnoses (in year) at the Trust and how this has changed over time.



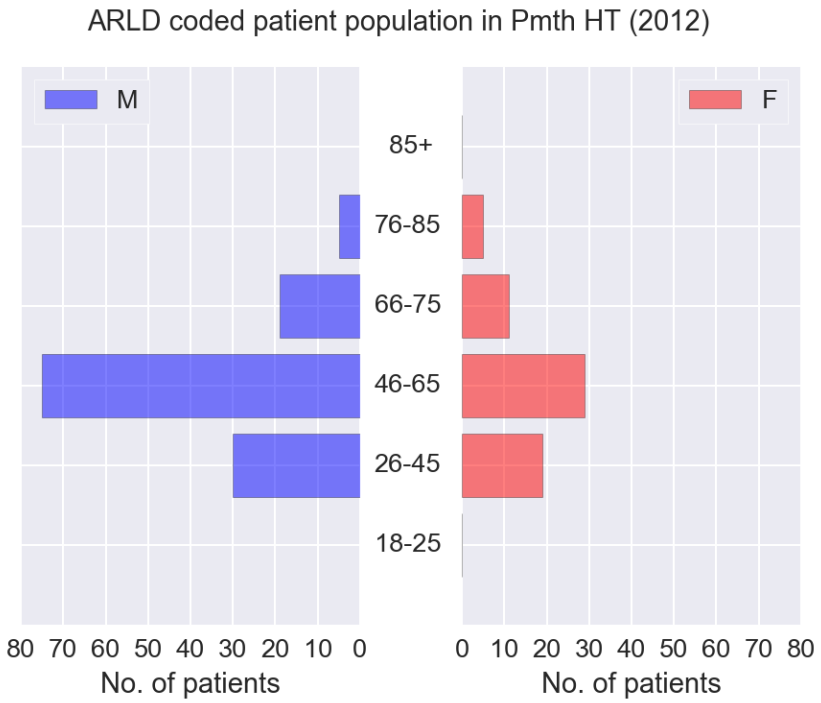
Impact of alcohol on Liver Disease (2012 cohort) at Trust

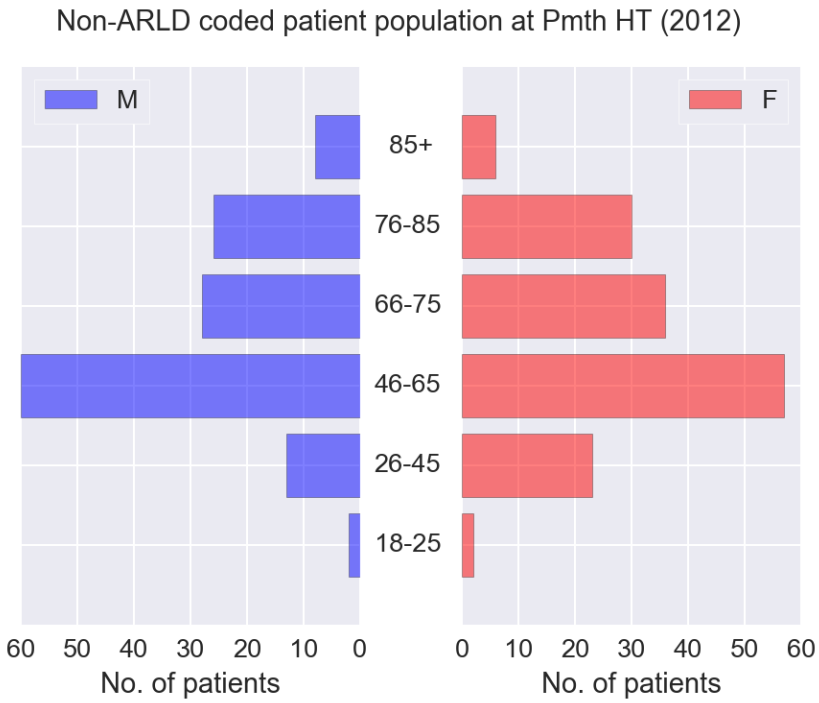
- 484 patients were admitted for LD for the first time in 2012
- **Over 4 years (2012-2015)** these patients had:
  - 925 Admissions
  - 212 Deaths (44% died)
- A comparison of those with an ARLD diagnosis and those without is shown below **over the 4 year period**:

ARLD	Non-ARLD
193 Patients (40% of cohort)	291 Patients (60% of cohort)
510 Admissions (55% of cohort admissions)	415 Admissions (45% of cohort admissions)
2.6 Admissions per patient on average (mean)	1.4 Admissions per patient on average (mean)
100 Deaths (52% died)	112 Deaths (38% died)
	3.8% of LD patients not diagnosed with ARLD had at least 1 alcohol-specific admission

ARLD patients have a greater number of admissions on average than other Liver Disease patients

ARLD patient demographics at Trust (2012 cohort)





ARLD patients are on average younger and more likely to be male

Key Narrative

Patients admitted with an ARLD code are on average younger than those without (median age: 56yrs compared with 64yrs).

Patients admitted with an ARLD code are more likely to be male (67% of ARLD group) that those without (47% male in non-ARLD group).

Liver Disease survival at Trust: 2012 cohort, ages 46-65 years

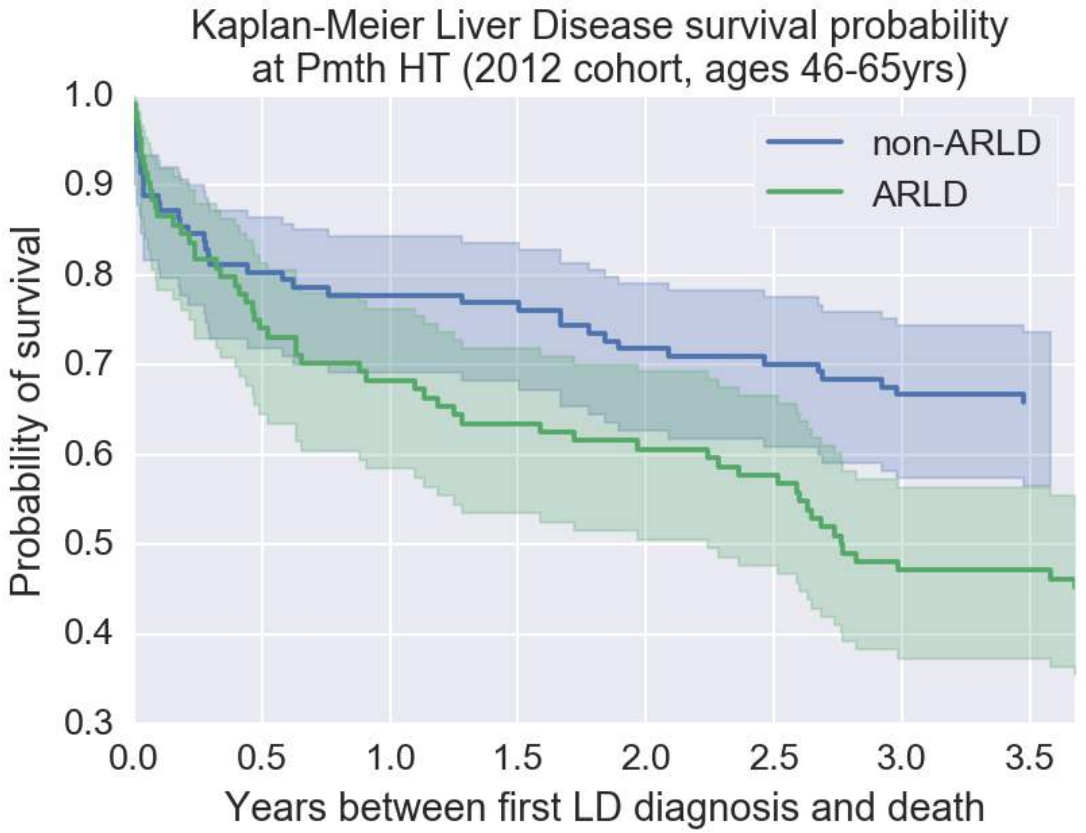
Key Narrative

Based on those admitted for the first time with a LD diagnosis in 2012 (age 45-65):

The probability of a LD patient surviving after first diagnosis (of any LD) in Wessex is much lower for those who have ARLD diagnosed.

At the Trust within 3 years of first LD diagnosis the probability of death for an ARLD diagnosed patient is 52%, compared with 33% for a non-ARLD patient.

Note: deaths only include those recorded on Trust data systems.



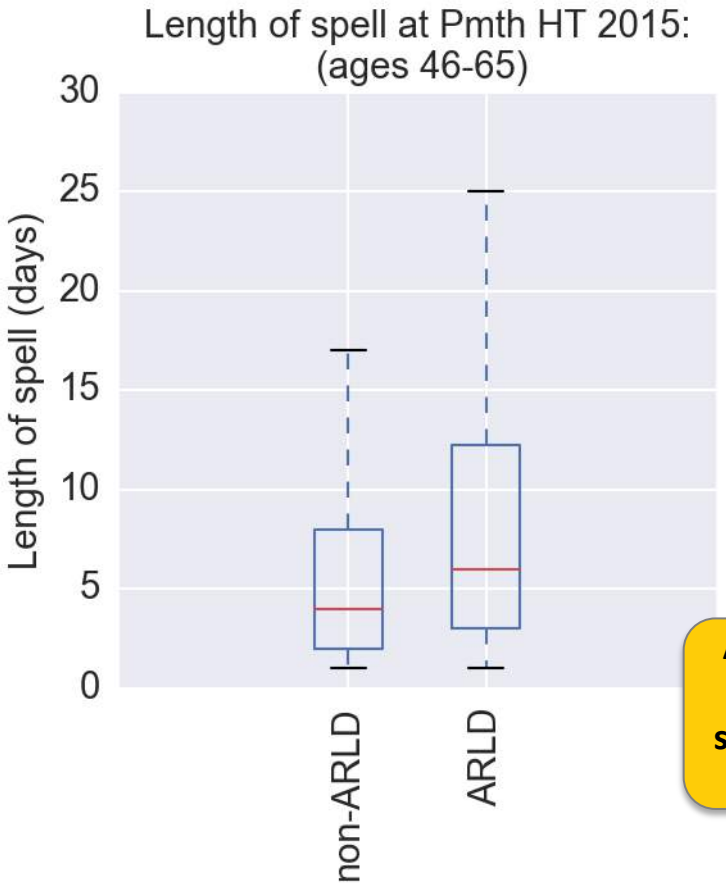
There is increased mortality in patients diagnosed with ARLD

Liver disease Length of Stay at Trust (46-65 years)

Key Narrative

When comparing the most common ARLD age group (46-65yrs) difference in length of stay (LOS) is greater on average by 2 days (4 days rather than 6).

There are likely to be undiagnosed ARLD patients in the non-ARLD group, hence the difference in LOS may be even greater than that shown here.

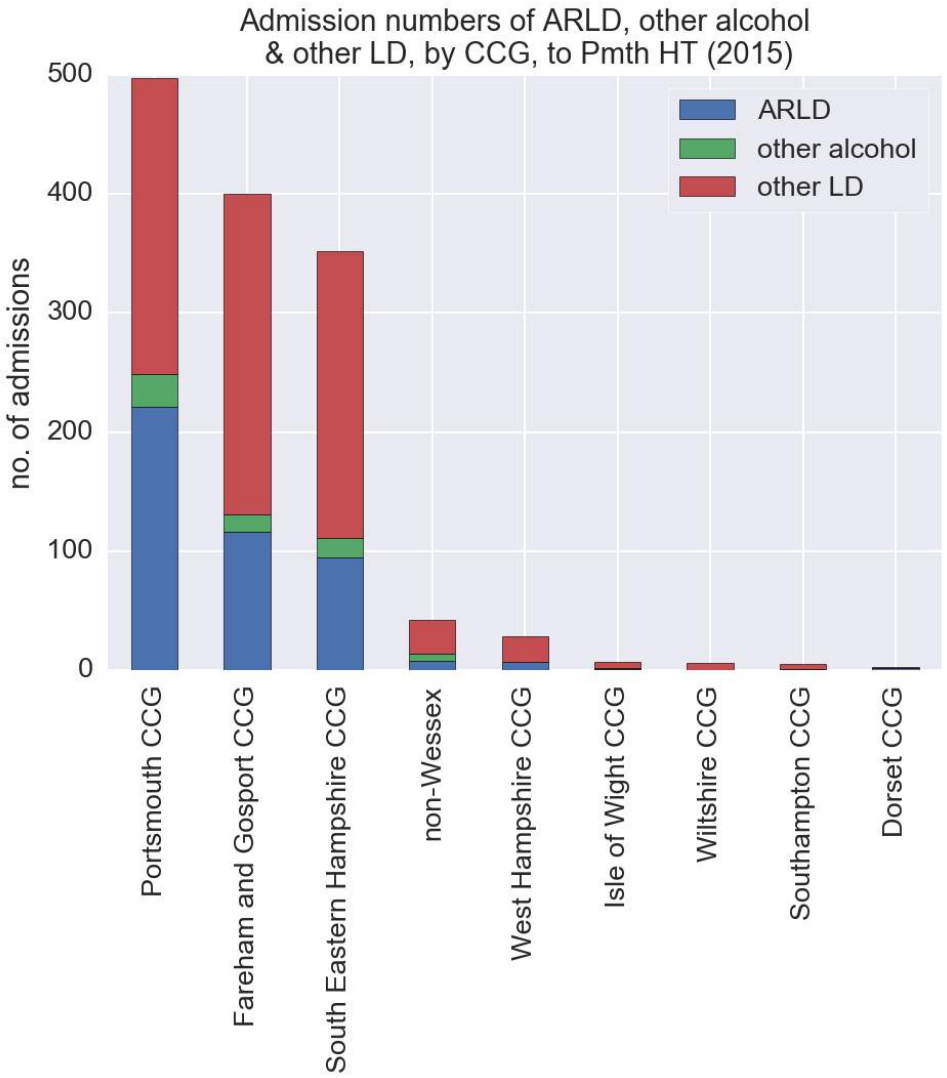


ARLD patients have greater lengths of stay than other Liver Disease patients

Number of Liver Disease admissions at Trust from CCGs across Wessex (2015)

Key Narrative

This shows the activity of Liver Disease patients at the Trust from each of the CCGs to which patients are registered.

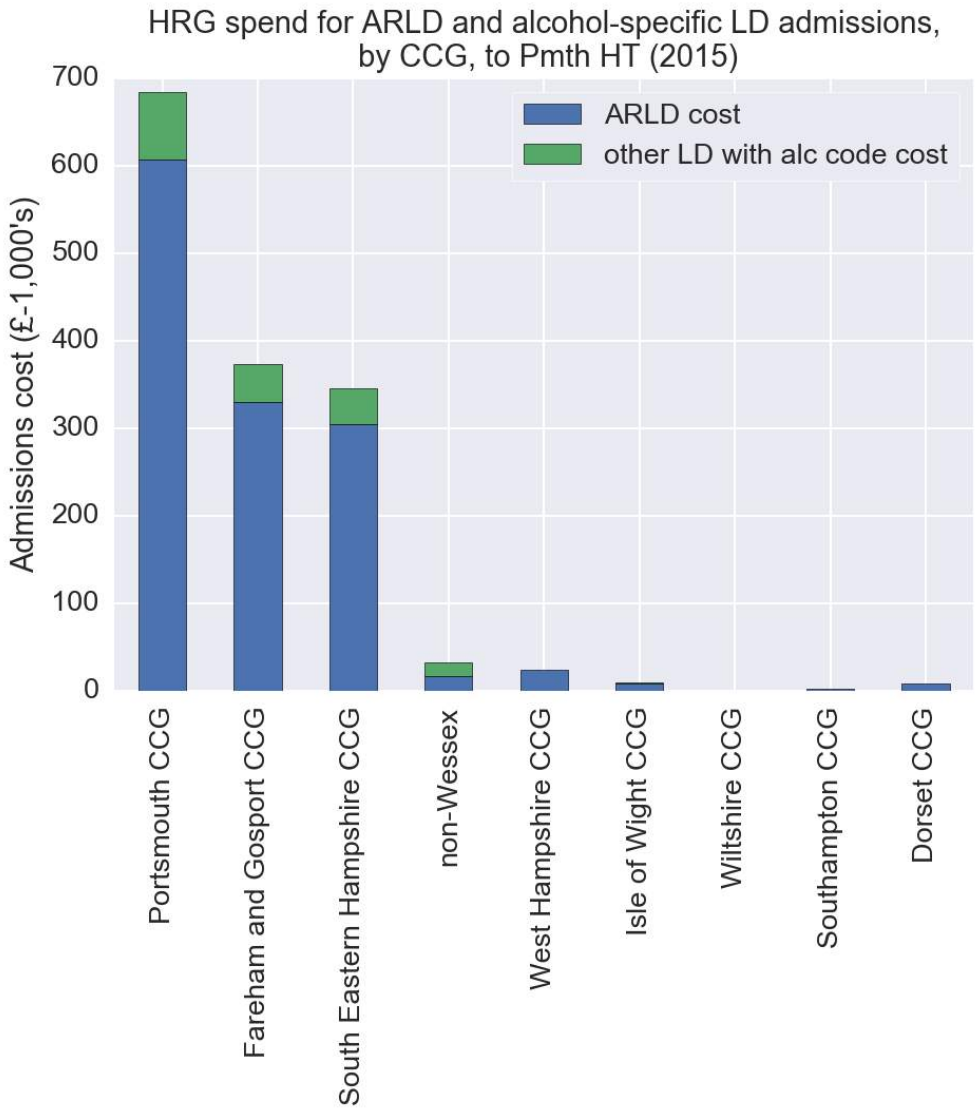


CCG variation: HRG spend for Alcohol-specific Liver Disease admissions at Trust (2015)

Key Narrative

Cost for each admission were calculated using PbR tariffs.

Note: not all admissions could have a PbR tariff attached. Therefore approximately 10% of admission costs are not included in these figures.



Admissions/bed days/spend on LD & ARLD admissions to Trust, from CCGs across Wessex (2015)

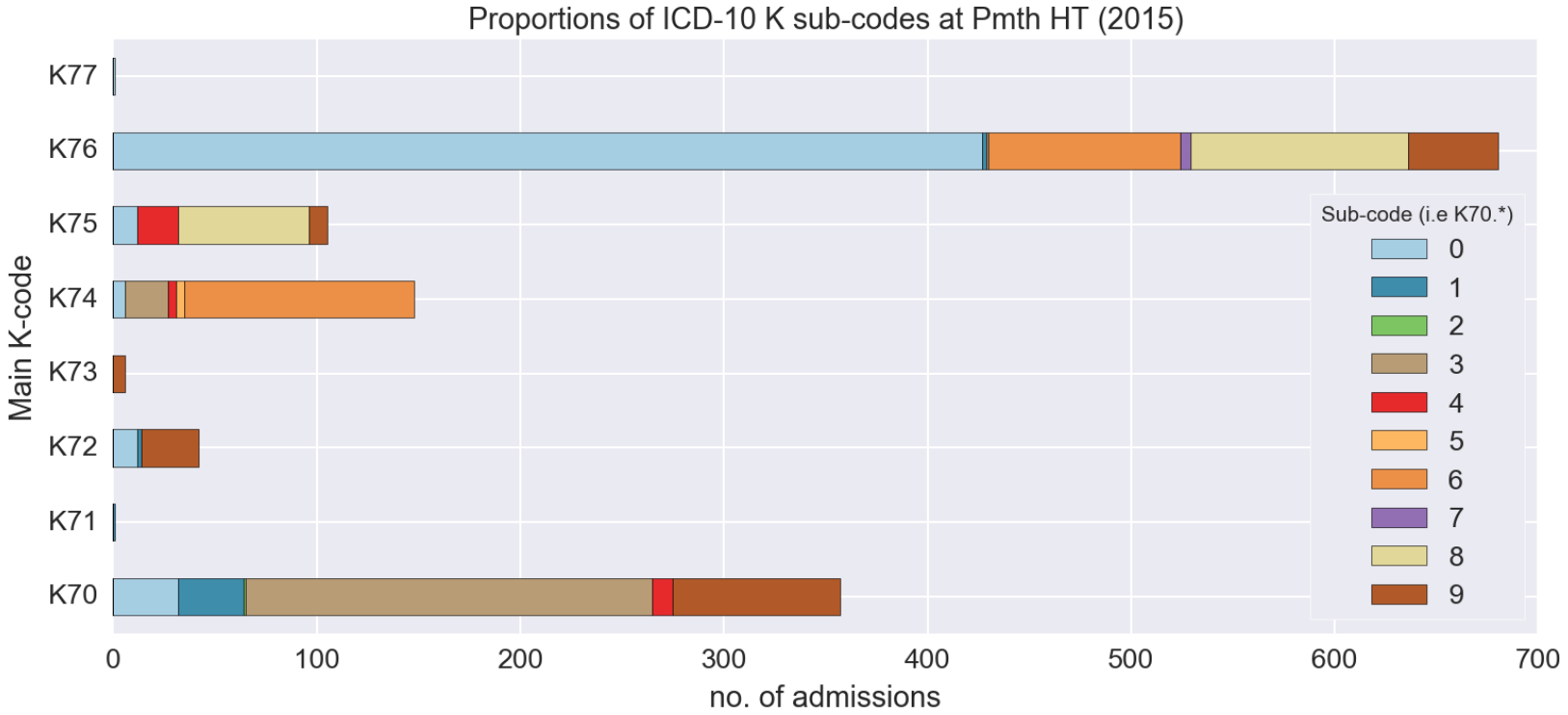
CCG name	No. of Liver Disease admissions	Liver Disease HRG admission costs (£)	No. of ARLD admissions	No. of ARLD bed days	ARLD HRG admission costs (£)	Average (mean) length of stay of ARLD admission (days/adm)	Average (mean) cost of ARLD admission (£/adm)
Portsmouth CCG	497	£1,359,500	221	1996	£606,730	9.0	£2,745
Fareham and Gosport CCG	400	£1,187,290	116	1170	£329,520	10.1	£2,841
South Eastern Hampshire CCG	352	£1,120,060	95	1287	£304,570	13.5	£3,206
non-Wessex	42	£121,720	8	61	£16,820	7.6	£2,102
West Hampshire CCG	28	£87,750	7	59	£24,330	8.4	£3,475
Isle of Wight CCG	7	£42,440	1	17	£8,540	17.0	£8,542
Wiltshire CCG	6	£12,490	0				
Southampton CCG	5	£17,620	1	3	£1,960	3.0	£1,960
Dorset CCG	3	£12,210	2	40	£8,920	20.0	£4,462

Key Narrative

This table gives Trust information specific to the CCG where the admitted patient is registered. For all Liver Disease admissions it presents: total number of admissions and total HRG spend for these. For ARLD admissions (a subset of the LD) it presents: numbers of admissions, bed days used & total HRG spend, as well as the average length of stay and average cost per admission.

Note: not all admissions could have a PbR tariff attached. Therefore approximately 10% of admission costs are not included in these figures.

Admission coding by Liver Disease code (final K-code of spell): sub codes



Key Narrative

This slide gives detail on the proportion of Liver Disease diagnoses (down to ICD-10 sub codes) occurring in the Trust in 2015. This is most likely of interest to coding department and Hepatologists.

Liver diagnosis codes can change at each FCE within a spell. This plot is based on the liver code diagnosis found furthest toward the end of each spell. *Further info on the definitions of the ICD-10 codes used can be found in Appendix B.*

Admission coding by Liver Disease code (final K-code of spell)

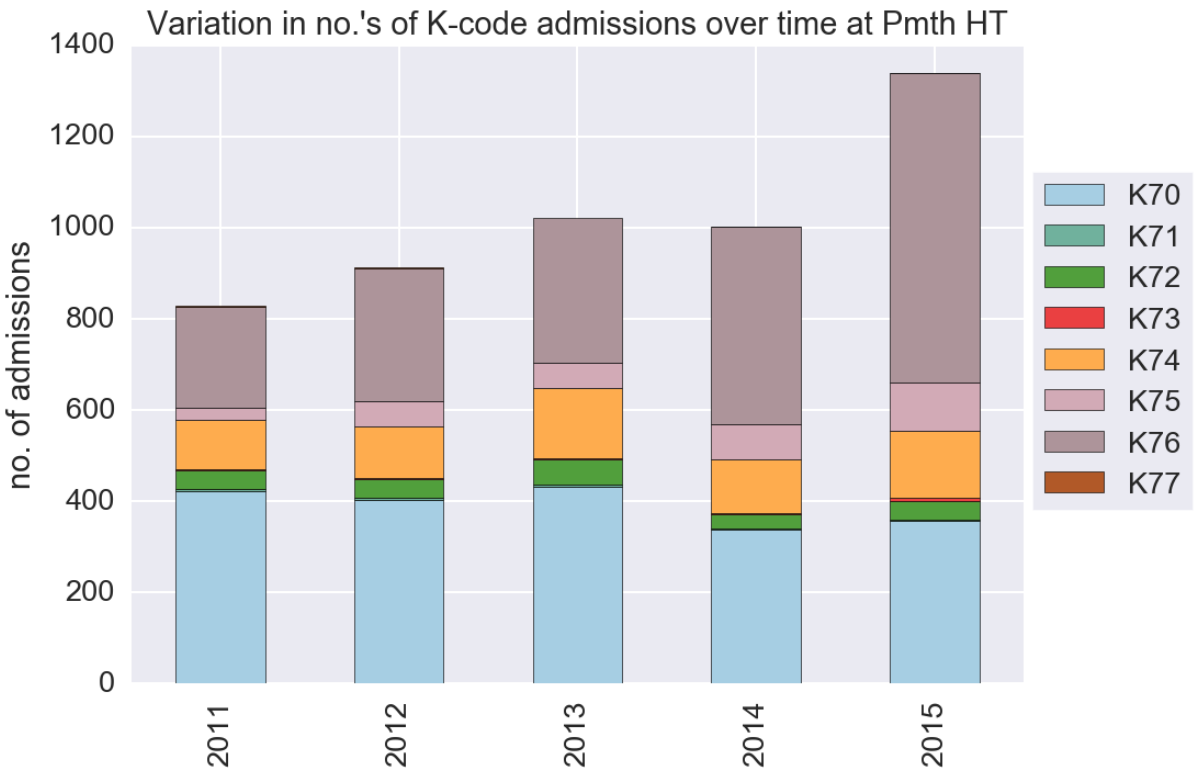
Key Narrative

This slide gives more detail on the proportion of Liver Disease diagnoses (main ICD-10 codes) occurring in the Trust admissions.

Most likely of interest to coding department and Hepatologists.

Liver diagnosis codes can change at each FCE within a spell. This is based on the liver code diagnosis found furthest toward the end of each spell.

Further info on the definitions of the ICD-10 codes used can be found in Appendix B.



Top Liver Disease admitting wards at Trust: workload and coding (2014-2015)

Admitting ward (names from Trust database)	No. of Liver Disease admissions	No. of ARLD admissions	No. of alcohol-specific admissions	% of LD admissions that are ARLD	% of LD admissions that are alcohol-specific	% of admissions that have an F10 code
MAU	1123	579	638	52	57	40
SAU	482	42	66	9	14	7
C5	107	67	70	63	65	43
DCCQ	56	25	31	45	55	38
TSA	55	1	1	2	2	2
C6	46	26	29	57	63	28
D7	36	2	3	6	8	3
G7	34	4	4	12	12	3
F2	30	4	6	13	20	13
D1	27	9	13	33	48	33

Key Narrative

This table gives the Trust Wards which have the highest numbers of Liver Disease admissions. It gives the numbers of admissions for: LD, ARLD and 'alcohol-specific' admissions. The %'s of LD patients who were admitted with ARLD & 'alcohol-specific' conditions are also given. Finally the % of LD admissions who had an F10 code are given (Mental and behavioural disorders due to use of alcohol). The aim of this data is to allow targeting when implementing an ARLD pathway.

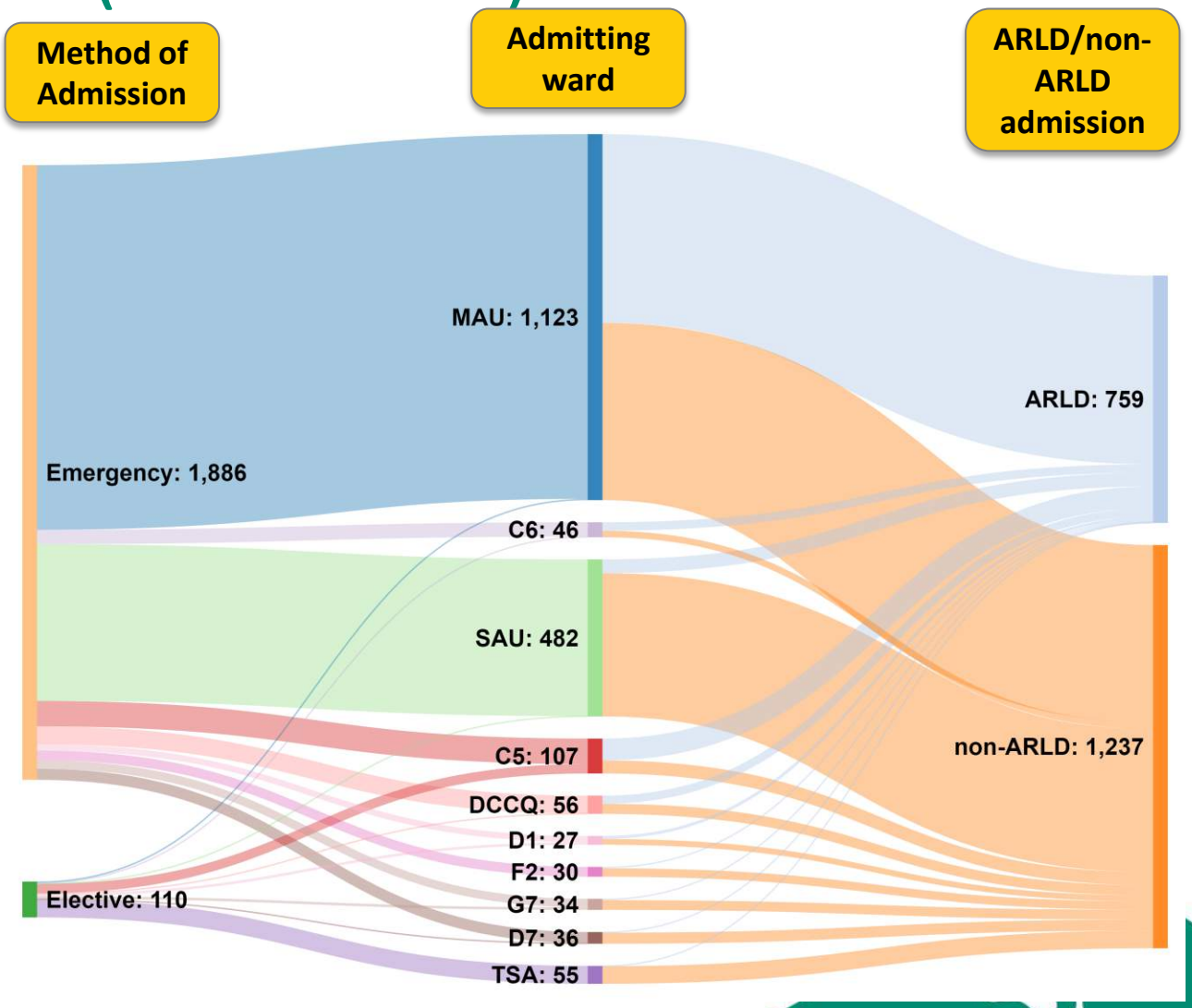
Liver Disease/ARLD patient paths through wards at Trust (2014-2015)

Key Narrative

This visualisation shows the routes of admission for Liver Disease and ARLD through wards at the Trust.

The width of the bars indicates the number of admissions.

The figure shows the proportion of emergency admissions & which wards they are admitted to (moving from left to right). The main wards upon which ARLD admissions occur can be seen from right to left.



Top Liver Disease admitting specialities at Trust: workload and coding (2014-2015)

Admitting Treatment Function	No. of Liver Disease admissions	No. of ARLD admissions	No. of alcohol-specific admissions	% of LD admissions that are ARLD	% of LD admissions that are alcohol-specific	% of admissions that have an F10 code
GENERAL MEDICINE (M)	1135	576	636	51	56	40
COLORECTAL SURGERY (S)	201	19	28	10	14	9
GENERAL SURGERY (S)	170	15	25	9	15	7
GASTROENTEROLOGY (M)	169	103	110	61	65	40
UPPER GI (S)	163	7	13	4	8	6
TRAUMA & ORTHOPAEDICS (S)	85	23	30	27	35	22
NEPHROLOGY (M)	69	9	9	13	13	1
UROLOGY (S)	67	5	6	8	9	3
RESPIRATORY (M)	54	20	25	37	46	22
CARDIOLOGY (M)	43	14	15	33	35	12

Key Narrative

This table gives the Specialities which have the highest numbers of Liver Disease admissions. It gives the numbers of admissions for: LD, ARLD and 'alcohol-specific' admissions. The %'s of LD patients who were admitted with ARLD & 'alcohol-specific' conditions are also given. Finally the % of LD admissions who had an F10 code are given (Mental and behavioural disorders due to use of alcohol). The aim of this data is to allow the targeting of work when implementing an ARLD pathway.

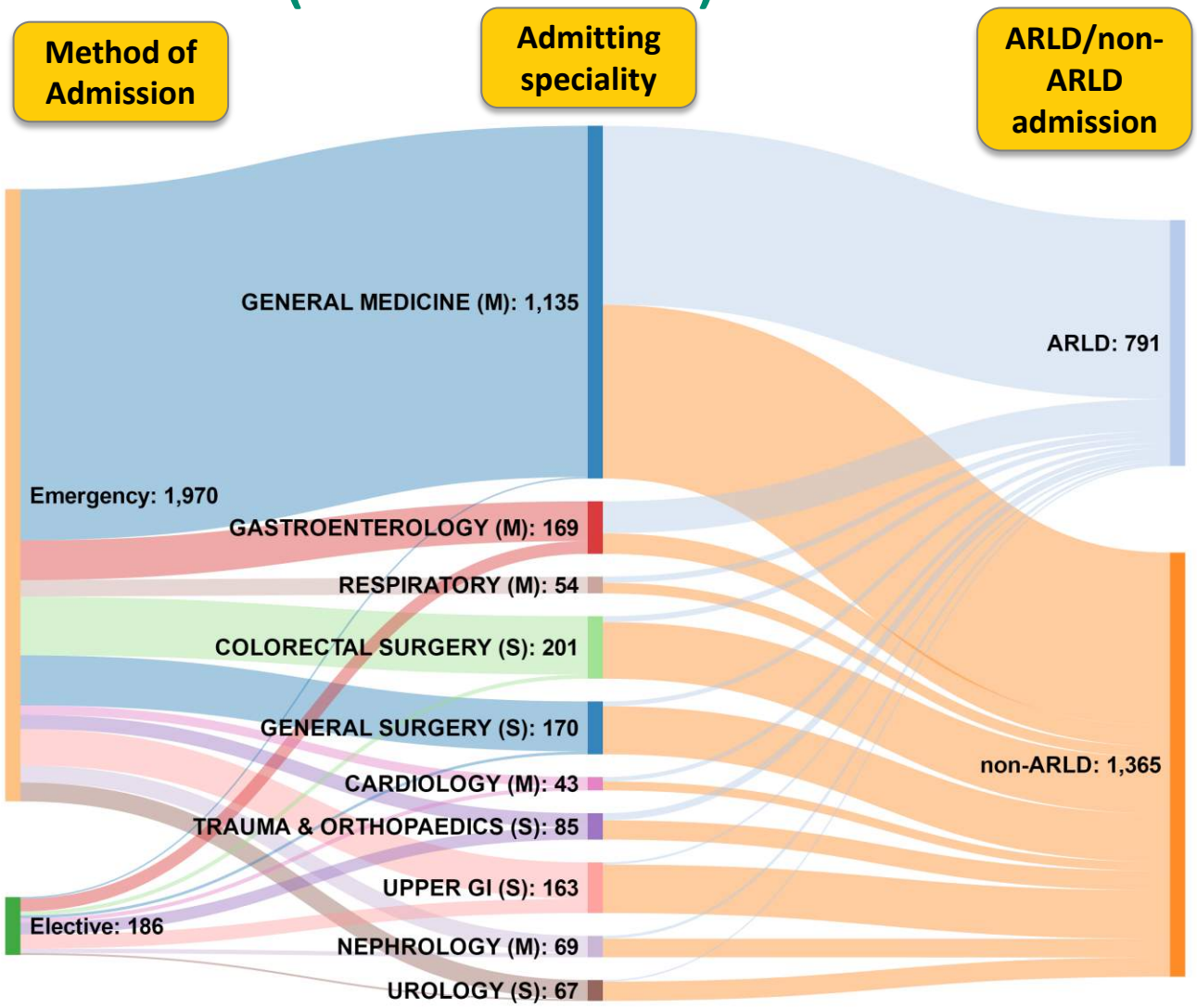
Liver Disease/ARLD patient paths through specialities at Trust (2014-2015)

Key Narrative

This visualisation shows the routes of admission for Liver Disease and ARLD through specialities at the Trust.

The width of the bars indicates the number of admissions.

The figure show the proportion of emergency admissions & which speciality they are admitted to. The main specialities upon which ARLD admissions occur can be seen from looking right to left.

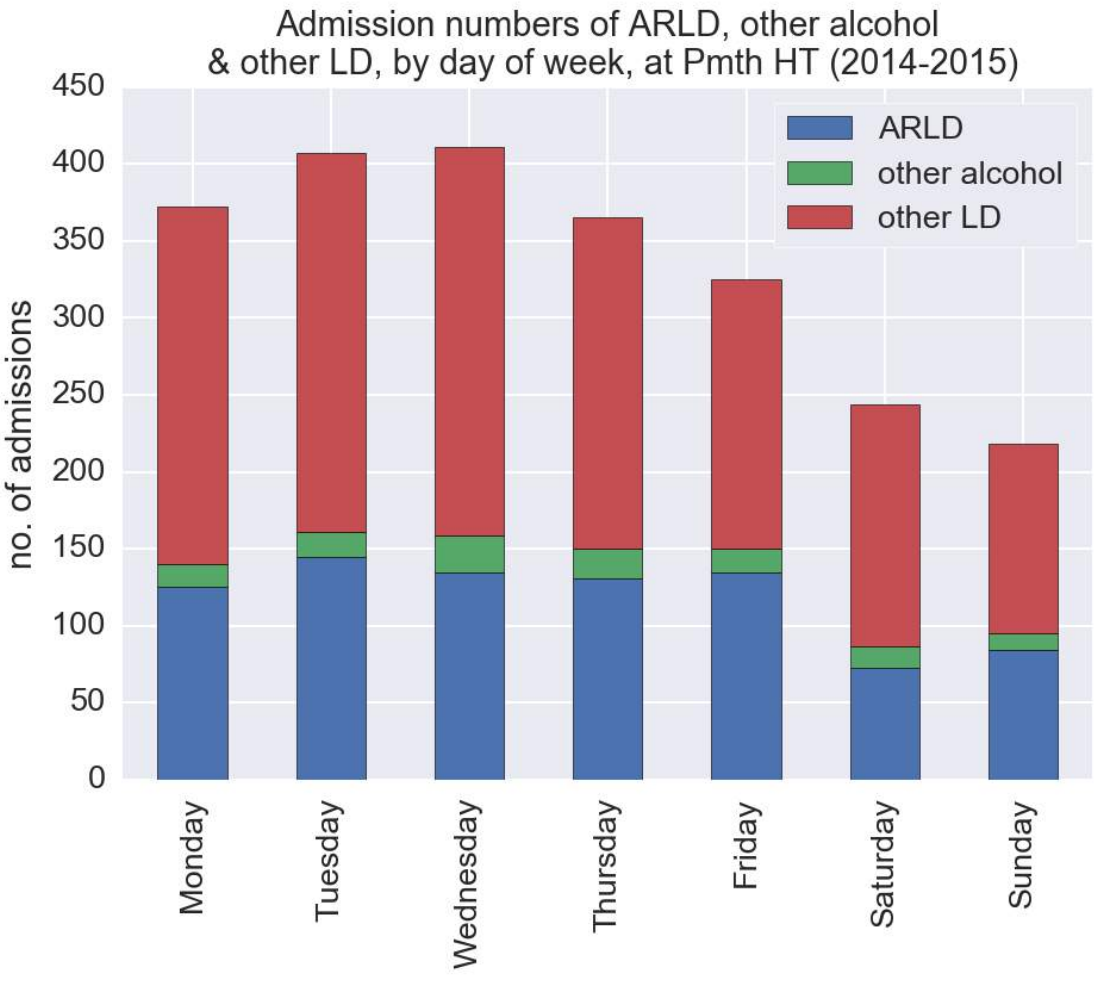


Number of Liver Disease admissions by day of the week

Key Narrative

This shows the numbers of LD patients being admitted by day of the week at the Trust, and the number of those who are diagnosed with ARLD or alcohol-specific admissions ('other alcohol').

The aim of this data is to allow the targeting of limited resources to those patients with ARLD.

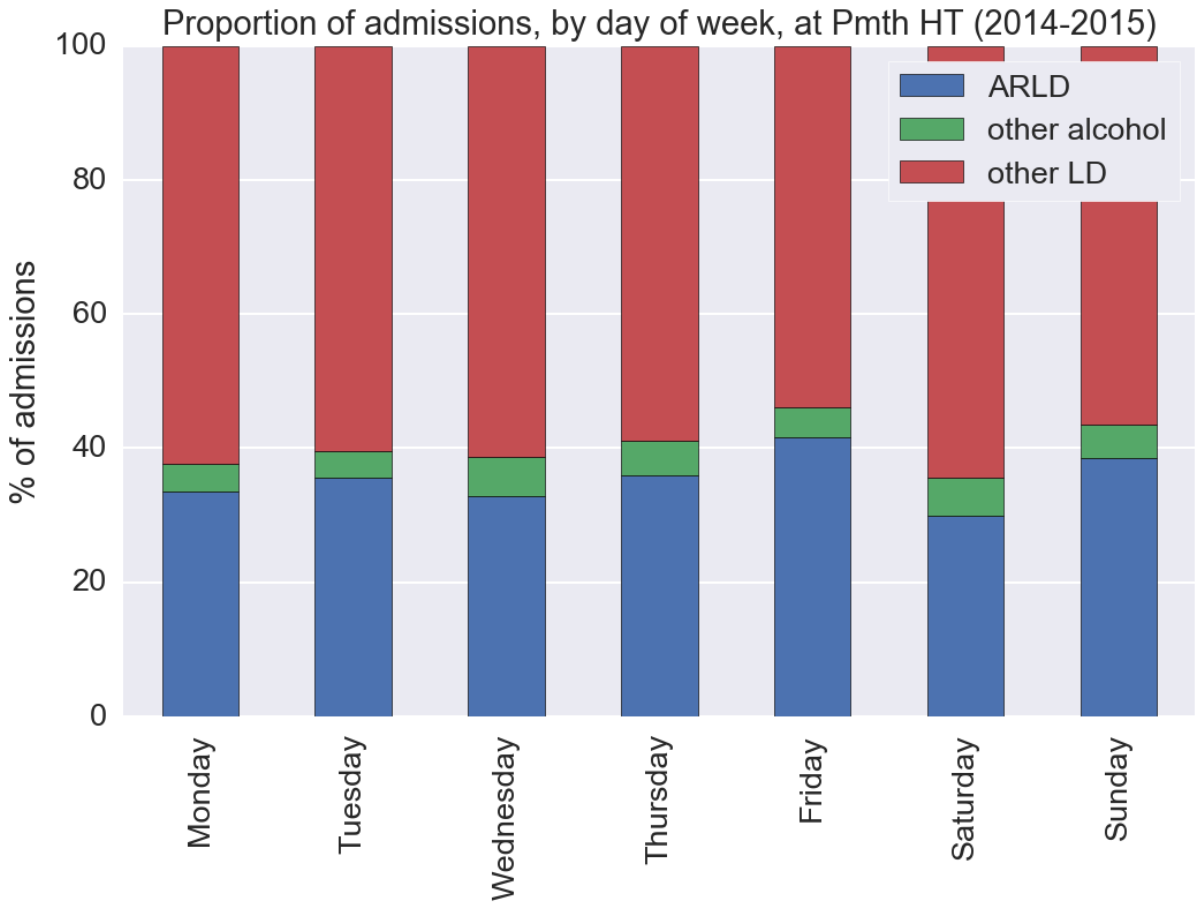


Proportion of ARLD & ‘other alcohol’ admissions by day of the week

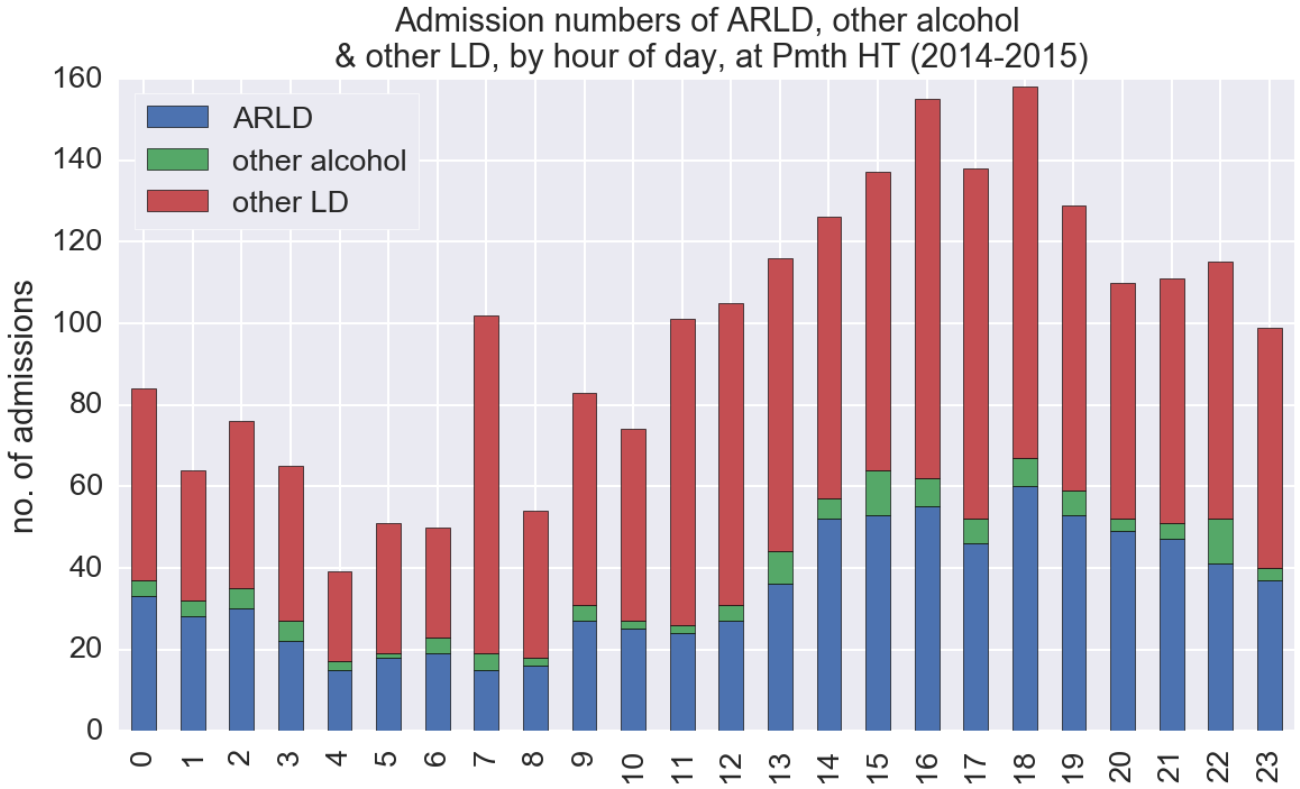
Key Narrative

This shows the proportion of those who are diagnosed with ARLD or alcohol-specific admissions (‘other alcohol’) by day of the week at the Trust.

The aim of this data is to allow the targeting of limited resources to those patients with ARLD.



Number of Liver Disease admissions by hour of day

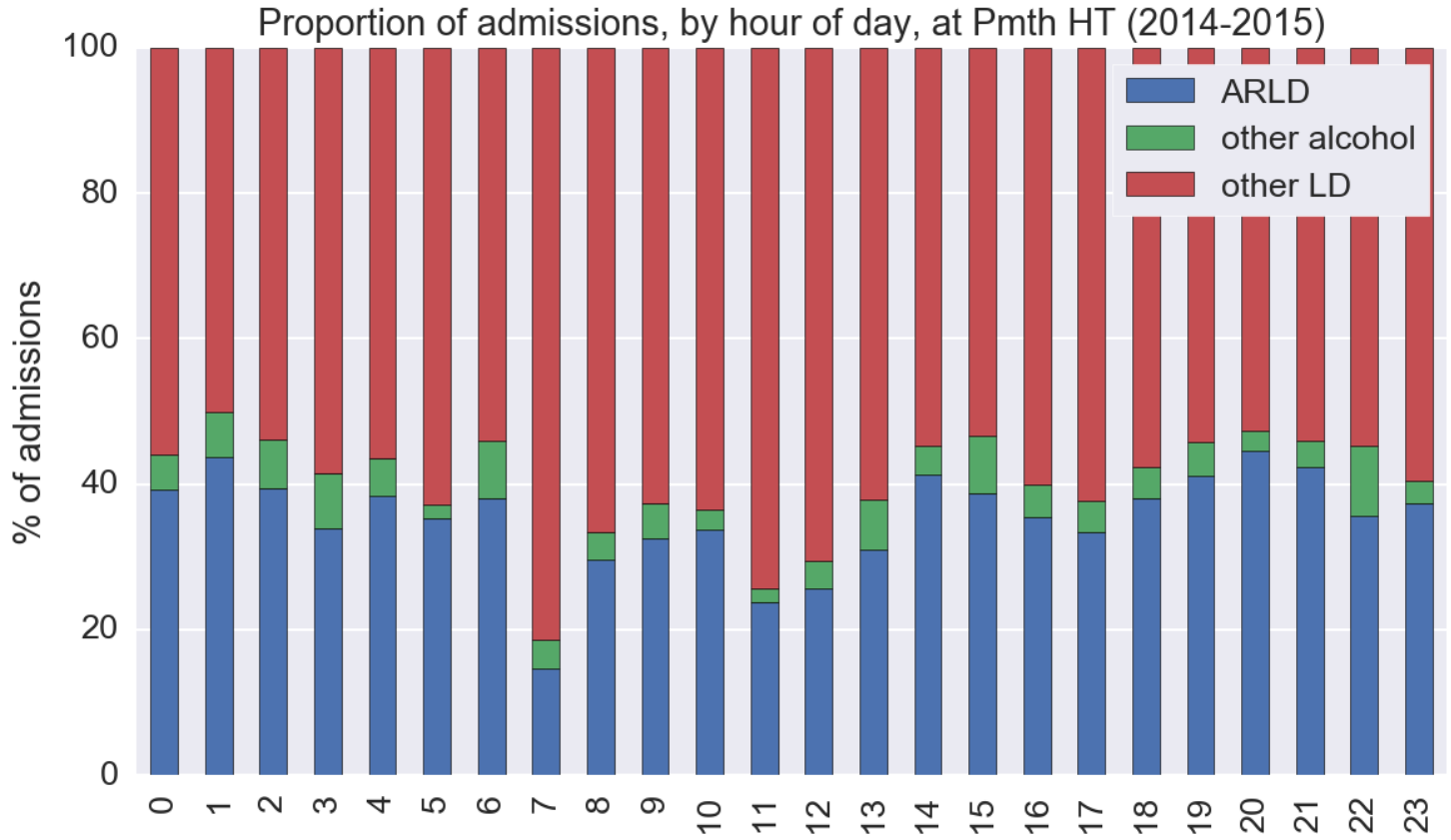


Key Narrative

This shows the numbers of LD patients being admitted by hour of the day at the Trust, and the number of those who are diagnosed with ARLD or alcohol-specific admissions ('other alcohol') in each hour.

The aim of this data is to allow the targeting of limited resources to those patients with ARLD.

Proportion of ARLD & ‘other alcohol’ admissions by hour of day



Key Narrative

This shows the proportion of those who are diagnosed with ARLD or alcohol-specific admissions (‘other alcohol’) at each hour of the day within the Trust.

Estimating early intervention cost avoidance in Wessex

- **Nuffield Trust report** on "Alcohol-specific activity in hospitals in England" (published Dec 2015) showed:
  - **rising burden of alcohol on A&E departments** (attendance rates doubled between 2008/09-2013/14)
  - highlighted the **possibility for earlier intervention**: ¾ of those diagnosed with ARLD during 2009/2010 had contact with hospital services the year before diagnosis.

Source:
http://www.nuffieldtrust.org.uk/node/4483

Estimating early intervention cost avoidance at Trust: current cost

For further detail on the method for the estimated cost avoidance see Appendix D

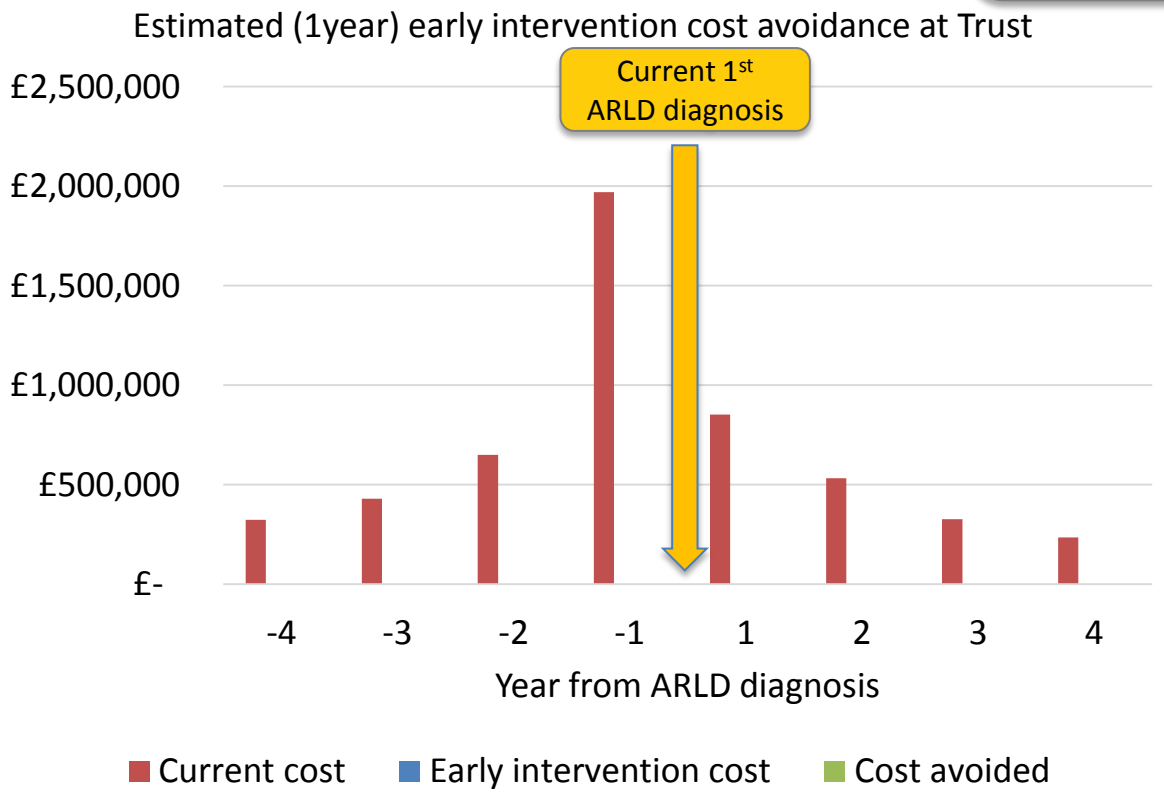
Key Narrative

The Nuffield Trust report showed the average number of: elective admissions, emergency admissions, A&E attendances and outpatient appointments for ARLD patients before and after first ARLD diagnosis.

There were 180 new ARLD diagnoses on average per year at the Trust and the costs of acute treatment for the cohort were estimated using National Schedule of Reference Costs (year 2014-15).

An annual mortality rate of 14.3% is used, as found from the Wessex Trust data examined.

The estimated annual cost of treatment for all ARLD patients at the single Trust is £5.3m.



The estimated annual cost of treatment for all ARLD patients at the Trust is £5.3m

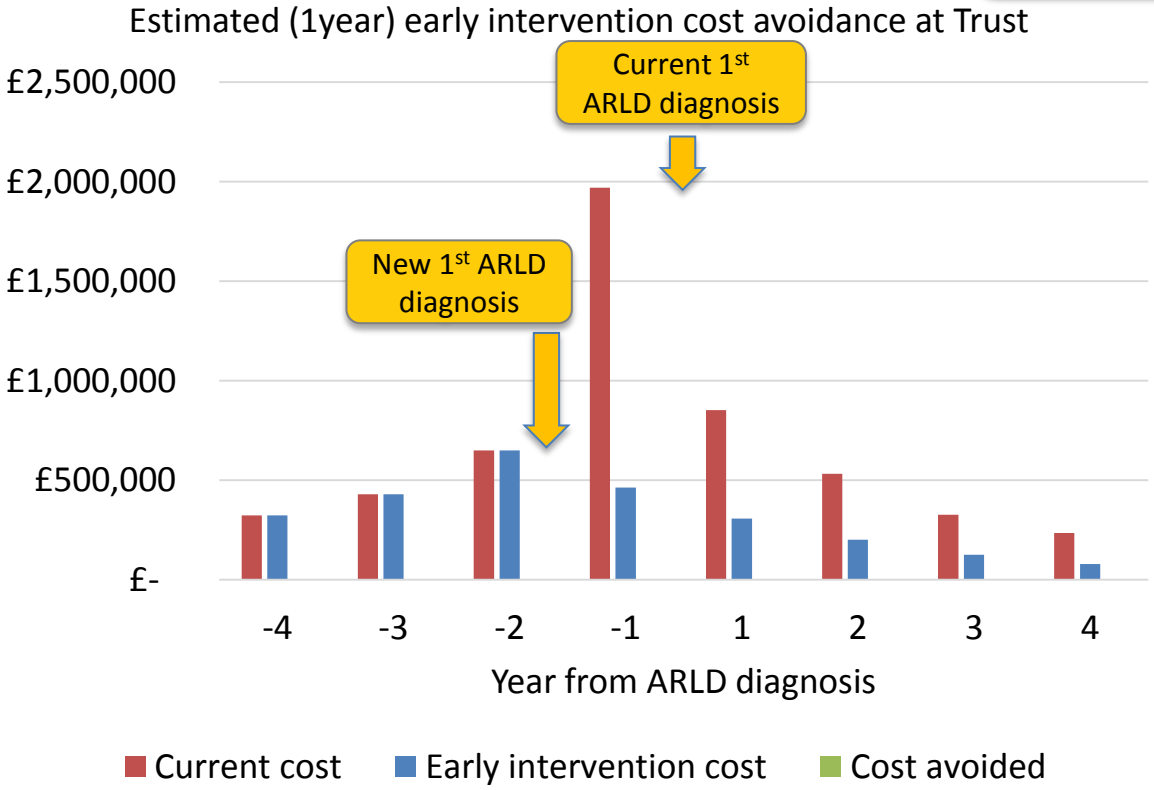
Estimating early intervention cost avoidance at Trust: new cost

For further detail on the method for the estimated cost avoidance see Appendix D

Key Narrative

Assuming earlier intervention prior to current first ARLD diagnosis (and a reduction in annual mortality rate), the subsequent reduction in elective admissions, emergency admissions and A&E attendances (but not outpatient appointments) would result in a reduced cost of managing the patient cohort each year after the earlier diagnosis.

If diagnosis of ARLD patients is brought forward by 1 year the new estimated annual cost of treatment is £2.6m. Bringing this forward by 2 years the estimated cost is £1.7m.



By improving the management of patients in the Acute Trust setting the treatment cost of ARLD patients is estimated to be between £1.7m - £2.6m per year

Estimating early intervention cost avoidance at Trust: cost avoided

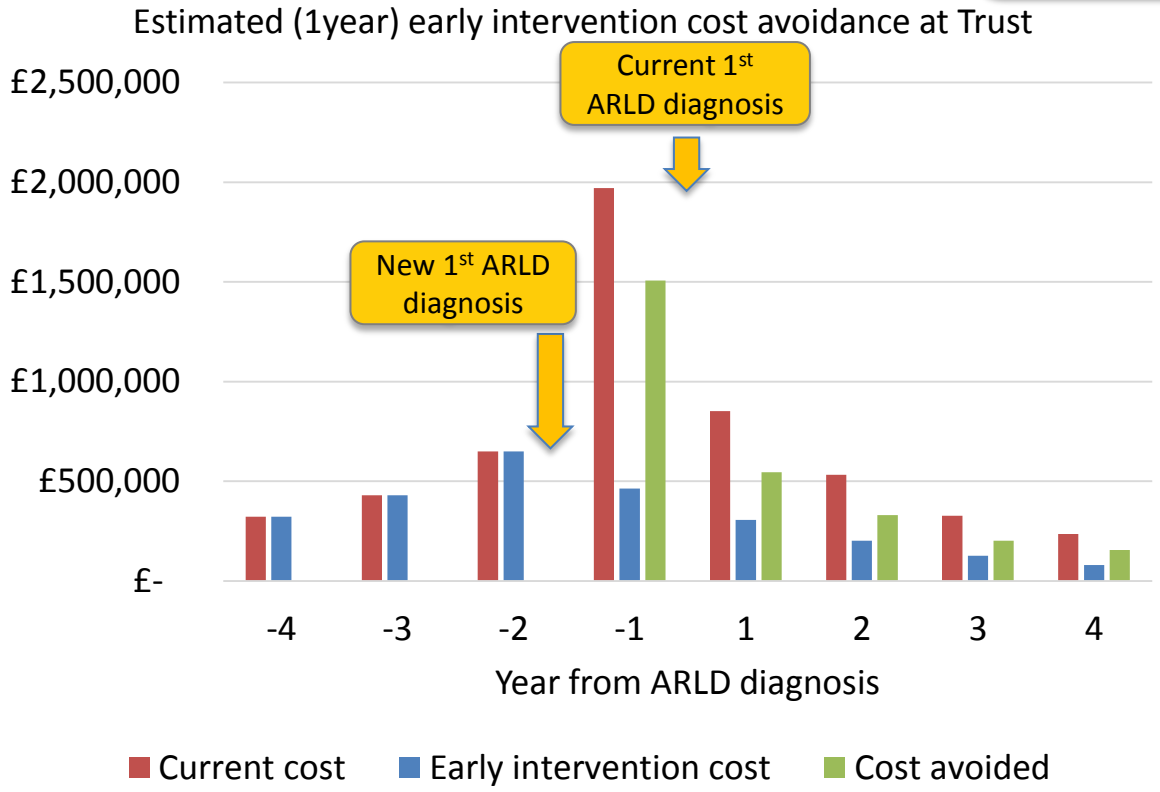
For further detail on the method for the estimated cost avoidance see Appendix D

Key Narrative

If diagnosis of ARLD patients is brought forward (by either 1 or 2 years) the estimated cost avoidance at the Trust is between £2.7m-£3.6m per year respectively.

Note: this is likely an under estimate as figures only include hospitalised costs; reduced costs in additional care settings could further increase the potential costs avoided.

Early intervention requires mandatory alcohol screening and referrals to alcohol care team. The cost of an alcohol team starts from £150k annually per Trust.



By improving the management of patients in the Trust setting it is estimated that a cost avoidance of £2.7-3.6m per year is possible

Estimating early intervention cost avoidance in Trust: where are costs avoided?

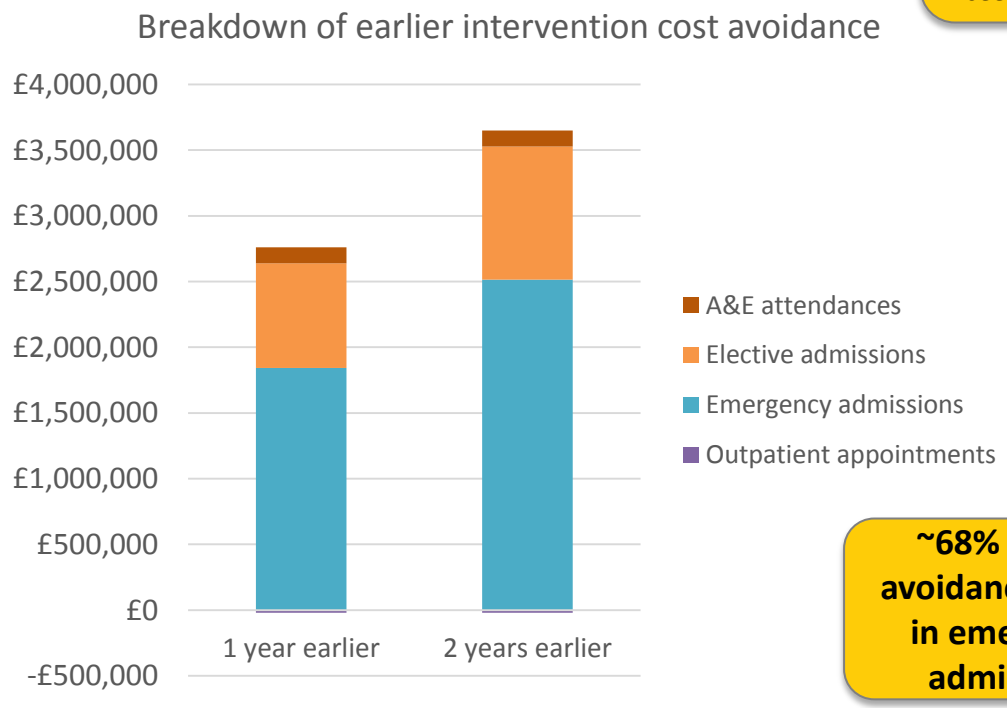
For further detail on the method for the estimated cost avoidance see Appendix D

Key Narrative

The estimated cost savings from intervening either 1 or 2 years earlier are broken down opposite.

The largest estimated cost avoidance is from emergency admissions (contributing ~68% of cost avoidance), followed by elective admissions (contributing ~28%).

An increase in cost is expected from outpatient appointments (due to the increased patient survival). This cost is relatively small in comparison and is included in the estimated cost avoidance quoted.



~68% of cost avoidance will be in emergency admissions

	1 year earlier	2 years earlier
Elective admissions	£796,900	£1,014,400
Emergency admissions	£1,843,300	£2,514,300
Outpatient appointments	-£21,200	-£21,200
A&E attendances	£120,800	£120,800
Total	£2,740,000	£3,630,000

What must you do for an effective ARLD pathway?

For Providers:

1. Implement a Trust alcohol strategy
2. Find an alcohol champion at executive level
3. Designate a board metric for Alcohol
   - e.g. NICE Alcohol Quality Standard
4. Mandatory alcohol screening and referral to alcohol team
   - A Trust alcohol team costs around £150k per annum and consists of:
     0.1-0.2 FTE hospital clinical lead
     2.0 FTE specialist nurses (one band 7 & one band 5 - mix of mental health and general nurses)
     1.0 FTE band 3 for alcohol screening
     1.0 FTE admin/pathway co-ordinator (for co-ordination and data)

For Commissioners:

1. Commission an alcohol pathway that supports earlier intervention
2. Ensure that routine monitoring systems are in place to track implementation of the new pathway

Wessex AHSN can offer you:

The Wessex AHSN have developed a toolkit to assist Trusts to implement system wide changes to how patients with ARLD are identified and managed within current resources.

This includes:

- an audit protocol
- implementation pack
- training resources
- access to Trust data

…to benchmark their organisation and monitor changes.

For more information please contact:
alcohol@wessexahsn.net

Contacts & Acknowledgements

Data and analysis produced by:

Dr Brad Keogh

brad.keogh@soton.ac.uk

@KeoghData

Wessex Centre for Implementation Science

Faculty of Health Sciences

University of Southampton

WessexCIS@soton.ac.uk

@WessexCIS

On behalf of Wessex Academic Health Science Network:

alcohol@wessexahsn.net

@WessexAHSN

With thanks to:

- Dr Julia Sinclair
- Dr Leonie Grellier
- Cathy Rule
- Kathy Wallis
- Prof Paul Roderick
- Dr Harriet Gordon
- Dr Richard Aspinall
- Dr Safa Al-Shamma
- Dr Nick Sharer
- Matt Winker
- Caroline Powell
- Bill Gillespie

Centre for Implementation Science

UNIVERSITY OF Southampton

Wessex Academic Health Science Network

Appendix A: Data definitions & limitations

Definitions:

- Liver Disease (LD) admissions were identified as: any admission with an ICD-10 diagnosis starting with ‘K7’ (anywhere within episode). See Appendix B for full list.
- Alcohol Related Liver Disease (ARLD) admissions were identified as: any admission with an ICD-10 diagnosis starting with ‘K70’ (anywhere within episode)
- Alcohol-specific LD admissions were identified with the same methodology as in the Local Alcohol Profiles England produced by PHE: any LD admission with an ICD-10 diagnosis within the list seen in Appendix C (anywhere within episode)

Limitations:

- Records are not linked between Trusts, hence the same patient may receive treatment at multiple Trusts but will be recorded as a separate individual within this dataset and corresponding analyses
- Any calculation involving a death involves only the deaths recorded on the Trust database (i.e. some deaths outside of the hospital may not be recorded)
- Although in some analyses patients are separated into ARLD/non-ARLD groups it is likely that there will always be patients in the non-ARLD group who in fact have not yet been diagnosed with ARLD
- PbR costs are not presented for one Trust as insufficient data was provided to calculate this. Of the admissions with suitable data 10% of the admissions could not have a PbR cost calculated (hence estimates of the total cost could be around 10% smaller than presented)

Appendix B: ICD-10 Liver Disease diagnosis codes (1/3)

ICD-10 code	Description
K70	**Alcoholic liver disease**
K70.0	Alcoholic fatty liver
K70.1	Alcoholic hepatitis
K70.2	Alcoholic fibrosis and sclerosis of liver
K70.3	Alcoholic cirrhosis of liver
K70.4	Alcoholic hepatic failure
K70.9	Alcoholic liver disease, unspecified
K71	**Toxic liver disease**
K71.0	Toxic liver disease with cholestasis
K71.1	Toxic liver disease with hepatic necrosis
K71.2	Toxic liver disease with acute hepatitis
K71.3	Toxic liver disease with chronic persistent hepatitis
K71.4	Toxic liver disease with chronic lobular hepatitis
K71.5	Toxic liver disease with chronic active hepatitis
K71.6	Toxic liver disease with hepatitis, not elsewhere classified
K71.7	Toxic liver disease with fibrosis and cirrhosis of liver
K71.8	Toxic liver disease with other disorders of liver
K71.9	Toxic liver disease, unspecified
K72	**Hepatic failure, not elsewhere classified**
K72.0	Acute and subacute hepatic failure
K72.1	Chronic hepatic failure
K72.9	Hepatic failure, unspecified

Source: WHO ICD-10 classifications
http://apps.who.int/classifications/icd10/browse/2016/en#/K70-K77

Appendix B: ICD-10 Liver Disease diagnosis codes (2/3)

ICD-10 code	Description
K73	**Chronic hepatitis, not elsewhere classified**
K73.0	Chronic persistent hepatitis, not elsewhere classified
K73.1	Chronic lobular hepatitis, not elsewhere classified
K73.2	Chronic active hepatitis, not elsewhere classified
K73.8	Other chronic hepatitis, not elsewhere classified
K73.9	Chronic hepatitis, unspecified
K74	**Fibrosis and cirrhosis of liver**
K74.0	Hepatic fibrosis
K74.1	Hepatic sclerosis
K74.2	Hepatic fibrosis with hepatic sclerosis
K74.3	Primary biliary cirrhosis
K74.4	Secondary biliary cirrhosis
K74.5	Biliary cirrhosis, unspecified
K74.6	Other and unspecified cirrhosis of liver
K75	**Other inflammatory liver diseases**
K75.1	Phlebitis of portal vein
K75.2	Nonspecific reactive hepatitis
K75.3	Granulomatous hepatitis, not elsewhere classified
K75.4	Autoimmune hepatitis
K75.8	Other specified inflammatory liver diseases: Nonalcoholic steatohepatitis [NASH]
K75.9	Inflammatory liver disease, unspecified

Source: WHO ICD-10 classifications
http://apps.who.int/classifications/icd10/browse/2016/en#/K70-K77

Appendix B: ICD-10 Liver Disease diagnosis codes (3/3)

ICD-10 code	Description
K76	**Other diseases of liver**
K76.0	Fatty (change of) liver, not elsewhere classified (Non-alcoholic fatty liver disease [NAFLD])
K76.1	Chronic passive congestion of liver
K76.2	Central haemorrhagic necrosis of liver
K76.3	Infarction of liver
K76.4	Peliosis hepatis
K76.5	Hepatic veno-occlusive disease
K76.6	Portal hypertension
K76.7	Hepatorenal syndrome
K76.8	Other specified diseases of liver
K76.9	Liver disease, unspecified
K77*	**Liver disorders in diseases classified elsewhere**
K77.0*	Liver disorders in infectious and parasitic diseases classified elsewhere
K77.8*	Liver disorders in other diseases classified elsewhere

Source: WHO ICD-10 classifications
http://apps.who.int/classifications/icd10/browse/2016/en#/K70-K77

Appendix C: Wholly alcohol attributable ICD-10 codes used to define alcohol-specific inpatient activity (alcohol-specific conditions)

ICD-10 code	Description
E24.4	Alcohol-induced pseudo-Cushing's syndrome
F10	Mental and behavioural disorders due to alcohol
G31.2	Degeneration of nervous system due to alcohol
G62.1	Alcoholic polyneuropathy
G72.1	Alcoholic myopathy
I42.6	Alcoholic cardiomyopathy
K29.2	Alcoholic gastritis
K70	Alcoholic liver disease
K85.2	Alcohol-induced acute pancreatitis
K86.0	Alcohol-induced chronic pancreatitis
Q86.0	Foetal alcohol syndrome (dysmorphic)
R78.0	Excess alcohol blood levels
T51.0	Ethanol poisoning
T51.1	Methanol poisoning
T51.9	Toxic effect of alcohol, unspecified
X45	Accidental poisoning by and exposure to alcohol
X65	Intentional self-poisoning by and exposure to alcohol, undetermined intent
Y15	Poisoning by and exposure to alcohol, undetermined intent
Y90	Evidence of alcohol involvement determined by blood alcohol content
Y91	Evidence of alcohol involvement determined by level of intoxication

Source: PHE England Local Alcohol Profiles User Guide
http://fingertips.phe.org.uk/profile/local-alcohol-profiles

Appendix D: Estimating early intervention cost avoidance in Wessex (1/7)

Introduction

The estimation of 'early intervention cost avoidance in Wessex' was calculated using data from a variety of sources:

- Wessex AHSN Acute Liver Disease database
- "*Alcohol-specific activity in hospitals in England*" (2015), Nuffield Trust report
- NHS reference costs 2014 to 2015*
- "*The Epidemiology of Alcoholic Liver Disease*" (2004), Mann R.E., Smart, R.G. & Govoni, R., Publication from the National Institute on Alcohol Abuse and Alcoholism

The method and assumptions made in the calculations are outlined in this appendix. The inputs and assumptions within the cost estimation model are summarised in the following slide with further detail surrounding the method following. All **cost estimates are at 2014/15 values**.

*Available here: https://www.gov.uk/government/collections/nhs-reference-costs

Appendix D: Estimating early intervention cost avoidance in Wessex (2/7)

'Current cost' model inputs

Model input	Value	Source/comments
Initial size of ARLD cohort	660 (Wessex), varies by Trust	Source: Wessex AHSN Acute Liver Disease database (2011-2015). Data showed ~660 patients each year between 2011-15 were newly diagnosed with ARLD in Wessex.
Annual mortality rate	Fixed annual rate of 14.3%	Source: as above. Annual rate calculated from the 4-year survival probability (54%) of ARLD patients who had first ARLD diagnosis in 2012. Note: deaths only include those recorded on Trust data systems.
Average additional utilisation rate of secondary care services by ARLD patients: 4-years before and after ARLD diagnosis	Rates vary based on year from ARLD diagnosis (values in Appendix D: 3/7)	Source: "Alcohol-specific activity in hospitals in England" (2015), Nuffield Trust report
Average cost of: elective admissions, emergency admissions, A&E attendances and outpatient appointments	Fixed cost based on 2014/15 prices (values in Appendix D: 5/7)	Source: NHS reference costs 2014 to 2015

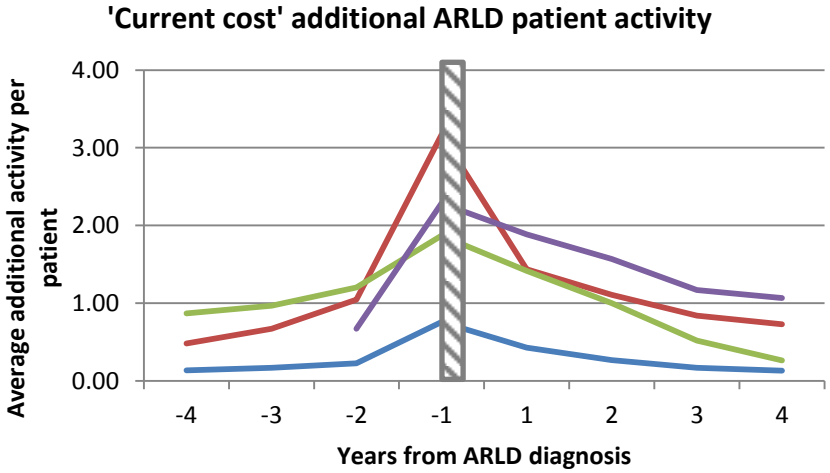
'New cost' model inputs

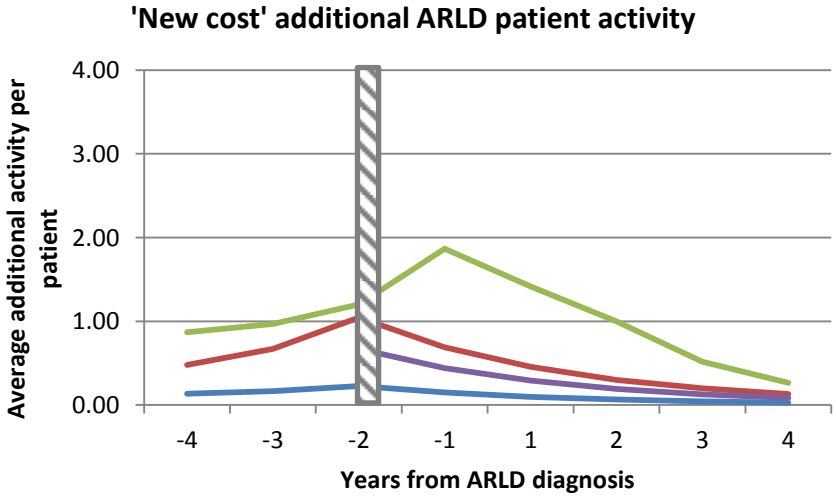
Model input	Value	Source/comments
Initial size of ARLD cohort	660 (Wessex), varies by Trust	Source: Wessex AHSN Acute Liver Disease database (2011-2015). Data showed ~660 patients each year between 2011-15 were newly diagnosed with ARLD in Wessex.
Annual mortality rate	Fixed annual rate of 2.1%	Source: "The Epidemiology of Alcoholic Liver Disease" (2004), Mann R.E., Smart, R.G. & Govoni, R., Publication from the National Institute on Alcohol Abuse and Alcoholism. Annual rate calculated from the 5-year survival probability (90%) of those with cirrhosis who stop drinking.
Average additional utilisation rate of secondary care services by ARLD patients: 4-years before and after ARLD diagnosis	Rates vary based on year from ARLD diagnosis (values in Appendix D: 3/7)	Source: "Alcohol-specific activity in hospitals in England" (2015), Nuffield Trust report. Modifications to the additional utilisation rates, reported by the Nuffield Trust, were made with the assumption that earlier diagnosis will lead to an earlier reduction in additional utilisation rates.
Average cost of: elective admissions, emergency admissions, A&E attendances and outpatient appointments	Fixed cost based on 2014/15 prices (values in Appendix D: 5/7)	Source: NHS reference costs 2014 to 2015

Appendix D: Estimating early intervention cost avoidance in Wessex (3/7)

Additional hospital usage of ARLD patients

The average hospital activity for ARLD diagnosed patients (above that of the average population) was taken from the Nuffield Trust Report (2015). This showed the average: elective admissions, emergency admissions, A&E attendances and outpatient appointments for ARLD patients before and after their first ARLD diagnosis. A summary of the additional activity as an 'age, sex & deprivation standardised rate per capita' is shown below (left). The 'current cost' estimates are based on this additional hospital utilisation rate. An assumption that earlier diagnosis will lead to a reduction in: elective admissions, emergency admissions and A&E attendances (but not outpatient appointments) is used. An annual reduction in the activity rate of 33% is assumed. The altered additional hospital utilisation (for diagnosis 1 year earlier) is shown below (right). This hospital utilisation is used for the 'new cost' estimations.





Appendix D: Estimating early intervention cost avoidance in Wessex (4/7)

Number of new diagnoses per year & mortality assumptions

The number of the newly diagnosed Wessex ARLD patients was identified from the Wessex AHSN Liver Disease database. There are ~660 new ARLD diagnoses at the 6 Acute Trusts in Wessex each year (2011-2015). The Wessex Trust data examined showed a 4-year survival rate of 54% (equal to an annual mortality rate of 14.3%). This survival rate is calculated only from the deaths known to the Trusts. This was used in the estimation of the 'current cost'.

Mann *et al* (2004) states the 5-year survival rate of cirrhosis patients who stop drinking as 90% (equal to an annual mortality rate of 2.1%). This value is used to estimate the cohort size in the 'new cost' estimation. This is thought to be a 'best case' survival rate and hence will produce a more conservative estimate of the possible cost avoidance (a smaller cohort being alive will result in lower service utilisation). The summary of the estimated cohort changes over time is shown in the table below.

					Diagnosis				
	Year	-4	-3	-2	-1	1	2	3	4	Annual mortality
CURRENT Patient Cohort	660	660	660	660	660	566	486	417	358	14.3%
NEW Cohort	660	660	660	660	660	647	634	621	609	2.1%

Appendix D: Estimating early intervention cost avoidance in Wessex (5/7)

Estimating additional hospital activity of ARLD patients and costs associated

The total additional hospital activity was calculated from the average additional activity rate multiplied by the number of patients alive in each year. The total cost of treatment was then calculated using average National Schedule of Reference Costs (Year: 2014/15) for: elective admissions, emergency admissions, A&E attendances and outpatient appointments. Costs used are shown in the table (right).

This was completed for the 'current cost' and 'new cost', which were then compared to give an estimated 'cost avoidance'. The summary table of calculations is given in the following slide.

Source: National Schedule of Reference Costs Year : 2014-15

Elective admission	£	3,945
Emergency admission	£	2,320
Outpatient appointment	£	178
A&E attendance	£	127

Average cost calculations: National schedule of reference costs

The reference costs are: the average unit cost to the NHS of providing secondary healthcare to NHS patients and are used to set prices for NHS-funded services in England.

The calculated average elective and non-elective admission costs were weighted by activity after the exclusion of tariff costs for: Labour and delivery incl. C-sections, Neonatal, Paediatric & Under 18 years. Non-elective long-stay and non-elective short-stay costs were weighted by activity in order to calculate an average emergency admission cost.

The average costs for A&E attendances and outpatient appointments were not weighted by activity. No exclusions were made to the A&E tariffs. The average cost for outpatient appointments was calculated from the hepatology treatment function only.

Appendix D: Estimating early intervention cost avoidance in Wessex (6/7)

The tabulated hospital activity and costs for the cohort, in the four years prior and the four years following ARLD diagnosis, are summarised below. In this example the 'new cost' is based on the 1-year earlier diagnosis of patients.

CURRENT ADDITIONAL COST

Year from current 1st diagnosis	-4	-3	-2	-1	1	2	3	4	Total
Addional elective admissions	88	110	149	499	241	130	70	46	
Additional emergency admissions	317	443	690	2,089	812	538	350	260	
Additional outpatient appointments	572	638	792	1,232	802	486	215	94	
Additional A&E attendances	-	-	441	1,508	1,067	761	487	382	
Spending estimate	**£ 1,183,952**	**£ 1,574,900**	**£ 2,384,742**	**£ 7,225,072**	**£ 3,111,640**	**£ 1,943,361**	**£ 1,185,714**	**£ 850,633**	**£ 19,460,015**
Addional elective admissions	£ 347,160	£ 433,950	£ 585,833	£ 1,967,240	£ 948,970	£ 513,152	£ 274,178	£ 181,583	
Additional emergency admissions	£ 734,976	£ 1,027,386	£ 1,601,871	£ 4,847,040	£ 1,884,395	£ 1,247,003	£ 811,401	£ 603,753	
Additional outpatient appointments	£ 101,816	£ 113,564	£ 140,976	£ 219,296	£ 142,726	£ 86,508	£ 38,350	£ 16,800	
Additional A&E attendances	£ -	£ -	£ 56,063	£ 191,496	£ 135,549	£ 96,698	£ 61,786	£ 48,497	

ESTIMATED NEW COST

Year from current 1st diagnosis	-4	-3	-2	-1	1	2	3	4	Total
Addional elective admissions	88	110	149	98	63	41	27	17	
Additional emergency admissions	317	443	690	456	295	191	123	80	
Additional outpatient appointments	572	638	792	1,232	917	634	321	161	
Additional A&E attendances	-	-	441	291	189	122	79	51	
Spending estimate	**£ 1,183,952**	**£ 1,574,900**	**£ 2,384,742**	**£ 1,700,182**	**£ 1,121,285**	**£ 732,514**	**£ 457,702**	**£ 287,860**	**£ 9,443,137**
Addional elective admissions	£ 347,160	£ 433,950	£ 585,833	£ 386,649	£ 250,162	£ 161,790	£ 104,592	£ 67,697	
Additional emergency admissions	£ 734,976	£ 1,027,386	£ 1,601,871	£ 1,057,235	£ 684,031	£ 442,389	£ 285,990	£ 185,106	
Additional outpatient appointments	£ 101,816	£ 113,564	£ 140,976	£ 219,296	£ 163,152	£ 112,852	£ 57,111	£ 28,579	
Additional A&E attendances	£ -	£ -	£ 56,063	£ 37,002	£ 23,940	£ 15,483	£ 10,009	£ 6,478	

COST AVOIDED	**£ -**	**£ -**	**£ -**	**£ 5,524,891**	**£ 1,990,355**	**£ 1,210,847**	**£ 728,012**	**£ 562,773**	**£ 10,016,878**

Appendix D: Estimating early intervention cost avoidance in Wessex (7/7)

The total: 'current cost', 'new cost' and 'cost avoided' estimations for the cohort over the 8 years is given in the table below for the assumption of diagnosing patients both 1-year and 2-years earlier.

Total 8-year estimated treatment costs associated with earlier diagnosis of ARLD

	CURRENT COST	NEW COST	COST AVOIDED
Diagnosis 1-year earlier	**£ 19,460,000**	**£ 9,440,000**	**£ 10,020,000**
Diagnosis 2-years earlier	**£ 19,460,000**	**£ 6,190,000**	**£ 13,270,000**

These values are the same as the annual cost if all ARLD patients (not just a single cohort) at the 6 Acute Trusts in Wessex were managed in the same way. It is therefore estimated that **across the 6 Acute Trusts there is a potential cost avoidance of between £10m - £13.3m per year** through the earlier diagnosis and management of ARLD patients**.**

Note: this is likely to be an under estimate of total cost as the figures only include hospitalised costs; reduced costs in additional care settings could further increase the potential costs avoided with earlier diagnosis.