Brief interventions delivered in GP surgeries to reduce problem drinking

Matrix Insight, in collaboration with Imperial College London, Kings College London and Bazian Ltd, were commissioned by Health England to undertake a research study to develop and apply a method for prioritising investments in preventative interventions for England. Seventeen preventative health interventions were included in the study. Each intervention was evaluated in terms of the following criteria: reach; inequality score; cost-effectiveness; and affordability. This report presents the results of the analysis for one of the interventions: brief interventions delivered in GP surgeries to reduce levels of drinking. The full report of the study is available from the ***H.E.L.P.*** website.

Summary

Description of the intervention
Physician advice in general practice regarding problem drinking. Intervention involved receiving a booklet, a workbook of current health behaviour, a review of prevalence of problem drinking, a list of adverse effects of alcohol, a worksheet on drinking cues, a drinking agreement (prescription and drinking diary cards) - intervention consisted of two 15 minute appointments a month apart. Patients received a follow-up call from a clinic nurse 2 weeks after each GP meeting (Fleming, 2000).

Criteria	Measure	Value	Certainty
1. Reach			
Percentage of population affected by the condition and that could potentially benefit from the intervention.	Adults attending routine general practice appointments and drinking above threshold limits as a percentage of the population aged 15 and above in England (LJMU, 2008; Healthcare Commission, 2008)	15.86%	★★★
2. Inequality score			
Ratio of the percentage of disadvantaged population to the percentage of the general population that could potentially benefit from the intervention.	Ratio of the percentage of heavy drinkers in skilled manual and part/non-skilled manual occupations to heavy drinkers in the general population (Batty et al, 2008)	1.78	★
3. Cost-effectiveness			
Cost of the intervention per QALY gained (in £2007/08)	See cost-effectiveness	£4,507	★★★
Net cost of the intervention per QALY gained (in £2007/08)	See cost-effectiveness	-£750	★★★
Timing of benefits	QALY gain and cost savings are estimated to occur in the long-run (5 years or more after the intervention).		
4. Affordability			
Total cost of implementing the intervention at the national level	Multiple of eligible individuals and unit cost of the intervention	Between £100 million and £1 billion	★★★

Key to certainty grading scales

★ Low quality evidence
★★ Medium quality evidence
★★★ High quality evidence

Box 1. Cost per QALY gained

A quality adjusted life year (QALY) is a simple way of combining quality of life with length of life.
One QALY is equivalent to one year in full health. The cost per QALY gained is therefore the cost of achieving one extra year of full health. Its calculation is based on the following formula:

$$cost\ per\ QALY\ gained = \frac{incremental\ cost\ of\ intervention}{QALYs\ gained}$$

The net cost per QALY gained is the cost per QALY considering the incremental cost of the intervention as well as the cost saved through health treatment avoided. Its calculation is based on the following formula:

$$net\ cost\ per\ QALY\ gained = \frac{incremental\ cost\ of\ intervention - cost\ savings}{QALYs\ gained}$$

Cost effectiveness

Cost. Brief interventions delivered in GP surgeries to improve reduce levels of alcohol consumption cost £105.08 per person more than usual care (£2007/08).

Effect. Brief interventions delivered in GP surgeries reduced average the level of alcohol consumption by 40% after 12 months. This was modelled by assuming that this average percentage reduction was experienced by everyone. This effect was obtained from a review undertaken to identify evidence on the effectiveness and cost-effectiveness of interventions to reduce alcohol consumption.

Benefits. The benefits of the intervention derive from reducing alcohol consumption. Two types of benefits are considered: QALYs and health care cost savings. Based on the QALYs gained and the health care cost savings of reducing alcohol consumption, a 40% decrease in the level of drinking is associated with the following benefits:

- An additional 0.0233 QALYs per person
- Cost savings of £123 per person (£2007/08)

Please refer to decision model for details on how the QALY gain and cost savings were calculated.

Decision model

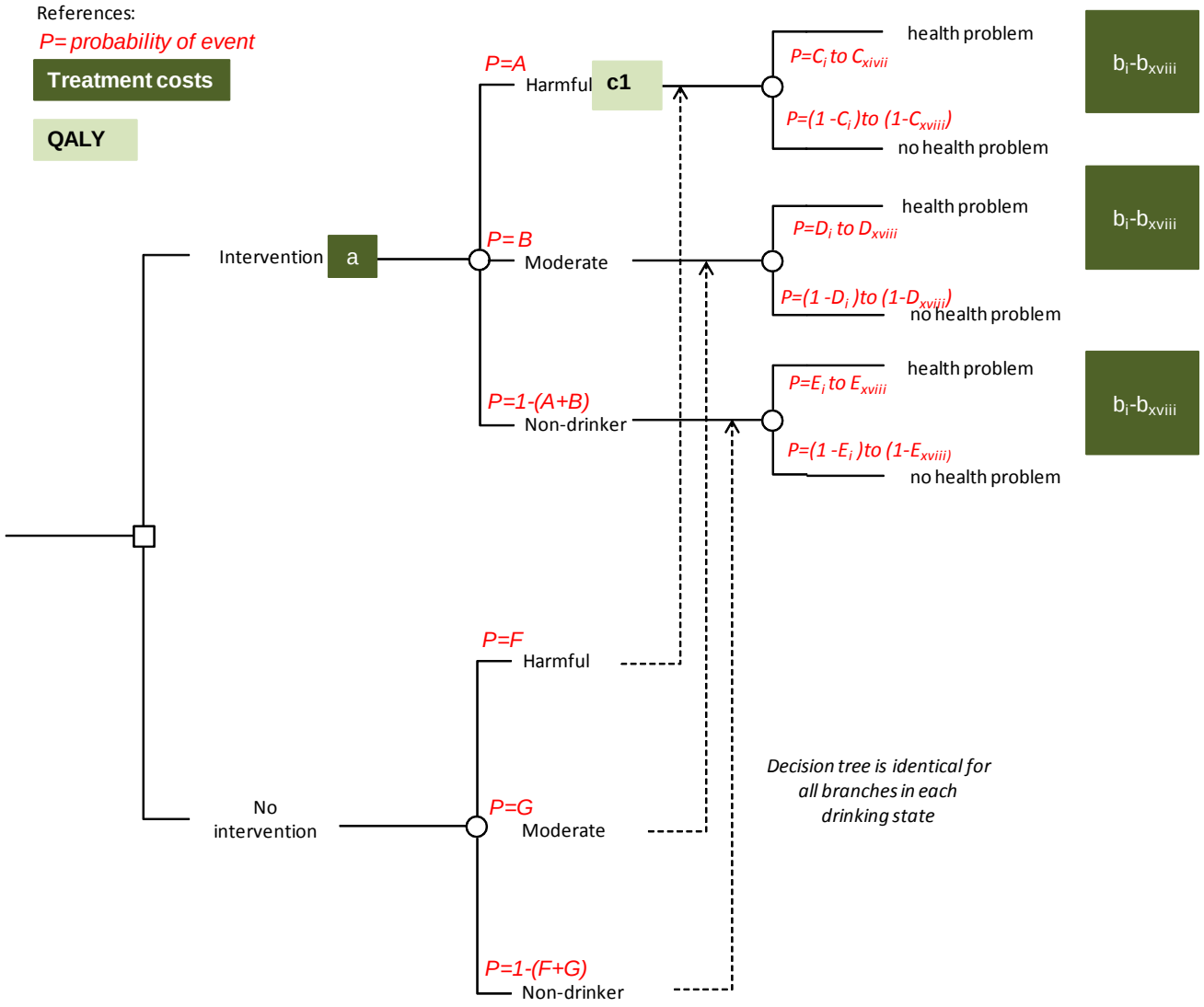
A dynamic model was built to estimate the cost-effectiveness of the intervention. The model estimates the QALY gain and cost savings associated with the intervention. Figure 1 illustrates the structure of the model, which is based on the following assumptions:

- The effect of the intervention is given by a change in the chances of an individual's reducing alcohol consumption.
- Individuals receiving the intervention are assumed to be 45 years old.
- Drinking is assumed to be associated with eighteen diseases. These diseases have impacts in terms of quality of life and health care costs.

    - Malignant neoplast of lip, oral cavity and pharynx
    - Malignant neoplast of oesophagus
    - Malignant neoplast of colon
    - Malignant neoplast of rectum
    - Malignant neoplast of liver and bile
    - Malignant neoplast of larynx
    - Malignant neoplast of breast
    - Diabetes mellitus (Type II)
    - Epilepsy and status epilepticus
    - Hypertensive diseases
    - Ischaemic Heart Disease
    - Cardiac arrhythmias
    - Haemorrhagic stroke
    - Ischaemic stroke
    - Oesophageal varices
    - Unspecified liver disease
    - Cholelithiasis
    - Psoriasis

- The probabilities of experiencing these diseases vary for heavy drinkers, moderate drinkers and non-drinkers. Those drinking less generally have reduced probabilities of experiencing the diseases. Thus, reducing alcohol consumption reduces the probability of experiencing these diseases and produces corresponding improvements in quality of life and health care cost savings.

Figure 1. Alcohol consumption model



The model draws the following estimates from the literature:

- The unit cost of the intervention (Table 1).
- The effect of the intervention on people's drinking behaviour (Table 1).
- The probabilities that those who drink experience diseases (Table 2).
- The probabilities that those who don't drink experience diseases (Table 2).
- The impact of experiencing diseases on quality of life, measured in QALYs (Table 3).
- The impact of experiencing diseases on health care treatment costs (Table 3).

Table 1. Intervention costs and effects (monetary values in £2007/08)

Ref	Description	Value	Calculation and source
a	Cost of intervention	£105.08	The total intervention costs include patient screening, assessment, a GP intervention of 15 minutes and two 5 minute practice nurse follow up calls, as well as the training required by staff. As reported in Ludbrook (2001) and based on work by Fleming (2000).
A	P(if intervention, heavy drinker)	11%	This is the percentage of individuals that are heavy drinkers following the intervention. This is based on the assumption that the average reduction is experienced by all individuals. See evidence review.
B	P(if intervention, moderate drinker)	64%	Applying the same effect and assumptions for moderate drinkers as for heavy drinkers.
F	P(if no intervention, heavy drinker)	18%	Current levels of heavy drinkers. Defined as 40 g/day or more for males and 19 g/day or more for females. LJMU (2008).
G	P(if no intervention, moderate drinker)	58%	Current level of moderate drinkers. Defined as 1-39 g/day for males and 1-18 g/day for females. LJMU (2008).

Table 2. Transition probabilities

Ref	Description	Value	Calculation and source
The probability of contracting the disease for non-drinkers was assumed to be equivalent to the average prevalence of the disease among heavy drinkers. To obtain these, the following formula was applied: $$D = \frac{x}{t} \cdot D_x \cdot RR_x + \frac{y}{t} \cdot D_x \cdot RR_y + \frac{z}{t} \cdot D_x \cdot RR_z$$ where: D = prevalence of disease; RR = relative risk of contracting the disease; x = non-drinkers; y = moderate drinkers; z = heavy drinkers.; and t = total population.			
C_i	P(if heavy drinker, Malignant neoplast of lip, oral cavity and pharynx)	0.041%	These were obtained by applying the following parameters to the formula set out at the beginning of this table (Table 2): ▪ Prevalence of the disease in the total population aged 55 to 64 years old (D=0.021%). Cancer Research UK statistics. ▪ Relative risk (RR heavy drinkers =3.3; RR moderate drinkers=1.5; RR non-drinkers=1). RR calculations have been based on weighted average RR scores based on different population with each drinking level. (Males1-19g/day = 1.43, Males20-39g/day = 1.86, Males40-74g/day = 3.11, Males75+g/day = 6.45, 0g/day = 1, Females1-19g/day = 1.43, Females20-39g/day = 1.86, Females40-74g/day = 3.11, Females75+g/day = 6.45). Based on RR from University of Sheffield (2008).
D_i	P(if moderate drinker, Malignant neoplast of lip, oral cavity and pharynx)	0.019%	
E_i	P(if non-drinker, Malignant neoplast of lip, oral cavity and pharynx)	0.012%	
C_{ii}	P(if heavy drinker, Malignant neoplast of oesophagus)	0.040%	These were obtained by applying the following parameters to the formula set out at the beginning of this table (Table 2): ▪ Prevalence of the disease in the population aged 55 – 64

Ref	Description	Value	Calculation and source
D_{ii}	P(if moderate drinker , Malignant neoplast of oesophagus)	0.024%	years old (D=0.026%). Cancer Research UK statistics. ▪ Relative risk (RR heavy drinkers =2.05; RR moderate drinkers=1.23; RR non-drinkers=1). RR calculations have been based on weighted average RR scores based on different population with each drinking level. (Males1-19g/day = 1.20, Males40-74g/day = 1.93, Males75+g/day = 3.59, 0g/day = 1, Females1-19g/day = 1.20, Females20-39g/day = 1.39, Females40-74g/day = 1.93, Females75+g/day = 3.59). Based on RR from University of Sheffield (2008).
E_{ii}	P(if non-drinker, Malignant neoplast of oesophagus)	0.020%	
C_{iii}	P(if heavy drinker, Malignant neoplast of colon)	0.068%	These were obtained by applying the following parameters to the formula set out at the beginning of this table (Table 2): ▪ Prevalence of the disease in the total population aged 55 to 64 years old (D=0.064%). Cancer Research UK statistics ▪ Relative risk (RR heavy drinkers =1.10; RR moderate drinkers=1.03; RR non-drinkers=1). RR calculations have been based on weighted average RR scores based on different population with each drinking level. (Males1-19g/day = 1.03, Males40-74g/day = 1.10, Males75+g/day = 1.21, 0g/day = 1, Females1-19g/day = 1.03, Females20-39g/day = 1.05, Females40-74g/day = 1.10, Females75+g/day = 1.21). Based on RR from University of Sheffield (2008).
D_{iii}	P(if moderate drinker, Malignant neoplast of colon)	0.064%	
E_{iii}	P(if non-drinker, Malignant neoplast of colon)	0.062%	
C_{iv}	P(if heavy drinker, Malignant neoplast of rectum)	0.054%	These were obtained by applying the following parameters to the formula set out at the beginning of this table (Table 2) ▪ Prevalence of the disease in the population aged 55 – 64 years old (D=0.048%). Cancer Research UK statistics. ▪ Relative risk (RR heavy drinkers =1.20; RR moderate drinkers=1.06; RR non-drinkers=1). RR calculations have been based on weighted average RR scores based on different population with each drinking level. (Males1-19g/day = 1.05, Males40-74g/day = 1.19, Males75+g/day = 1.42, 0g/day = 1, Females1-19g/day = 1.05, Females20-39g/day = 1.09, Females40-74g/day = 1.19, Females75+g/day = 1.42). Based on RR from University of Sheffield (2008).
D_{iv}	P(if moderate drinker, Malignant neoplast of rectum)	0.047%	
E_{iv}	P(if non-drinker, Malignant neoplast of rectum)	0.045%	
C_{iv}	P(if heavy drinker, Malignant neoplast of liver and bile)	0.011%	These were obtained by applying the following parameters to the formula set out at the beginning of this table (Table 2): ▪ Prevalence of the disease in the population aged 55 – 64 years old (D=0.009%). Cancer Research UK statistics. ▪ Relative risk (RR heavy drinkers =1.40; RR moderate drinkers=1.11; RR non-drinkers=1). RR calculations have
D_{iv}	P(if moderate drinker, Malignant neoplast of liver and bile)	0.009%	

Ref	Description	Value	Calculation and source
E_{iv}	P(if non-drinker, Malignant neoplast of liver and bile)	0.008%	been based on weighted average RR scores based on different population with each drinking level. (Males1-19g/day = 1.10, Males40-74g/day = 1.4, Males75+g/day = 1.81, 0g/day = 1, Females1-19g/day = 1.10, Females20-39g/day = 1.19, Females40-74g/day = 1.4, Females75+g/day = 1.81). Based on RR from University of Sheffield (2008).
C_{vi}	P(if heavy drinker, Malignant neoplast of larynx)	0.016%	These were obtained by applying the following parameters to the formula set out at the beginning of this table (Table 2): ▪ Prevalence of the disease in the population aged 55 – 64 years old (D=0.010%). Cancer Research UK statistics. ▪ Relative risk (RR heavy drinkers =2.16; RR moderate drinkers=1.25; RR non-drinkers=1). RR calculations have been based on weighted average RR scores based on different population with each drinking level. (Males1-19g/day = 1.22, Males40-74g/day = 2.02, Males75+g/day = 3.86, 0g/day = 1, Females1-19g/day = 1.22, Females20-39g/day = 1.43, Females40-74g/day = 2.02, Females75+g/day = 3.86). Based on RR from University of Sheffield (2008).
D_{vi}	P(if moderate drinker, Malignant neoplast of larynx)	0.009%	
E_{vi}	P(if non-drinker, Malignant neoplast of larynx)	0.007%	
C_{vii}	P(if heavy drinker, Malignant neoplast of breast)	0.212%	These were obtained by applying the following parameters to the formula set out at the beginning of this table (Table 2): ▪ Prevalence of the disease in the population aged 55 – 64 years old (D=0.195%). Cancer Research UK statistics. ▪ Relative risk (RR heavy drinkers =1.13; RR moderate drinkers=1.03; RR non-drinkers=1). RR calculations have been based on weighted average RR scores based on different population with each drinking level. (Males1-19g/day = 1, Males40-74g/day = 1, Males75+g/day = 1, 0g/day = 1, Females1-19g/day = 1.07, Females20-39g/day = 1.21, Females40-74g/day = 1.35, Females75+g/day = 1.46). Based on RR from University of Sheffield, (2008) although where no data existed (for males) a value of 1 was assumed.
D_{vii}	P(if moderate drinker, Malignant neoplast of breast)	0.193%	
E_{vii}	P(if non-drinker, Malignant neoplast of breast)	0.187%	
C_{viii}	P(if heavy drinker, Diabetes mellitus (Type II))	0.542%	These were obtained by applying the following parameters to the formula set out at the beginning of this table (Table 2): ▪ Prevalence of the disease in the population aged 55 – 64 years old (D=0.582%) Incidence based on US data from http://www.wrongdiagnosis.com/d/diabetes/incidence-types.htm and applied to UK population.
D_{viii}	P(if moderate drinker, Diabetes mellitus (Type II))	0.571%	

Ref	Description	Value	Calculation and source
E_{viii}	P(if non-drinker, Diabetes mellitus (Type II))	0.642%	▪ Relative risk (RR heavy drinkers =0.84; RR moderate drinkers=0.89; RR non-drinkers=1). RR calculations have been based on weighted average RR scores based on different population with each drinking level. (Males1-19g/day = 0.99, Males40-74g/day = 0.73, Males75+g/day = 0.73, 0g/day = 1, Females1-19g/day = 0.92, Females20-39g/day = 0.87, Females40-74g/day = 1.13, Females75+g/day = 1.13). Based on RR from University of Sheffield (2008) with the exception of those drinking over 75 g/day. Data was not available and therefore RR was assumed to be the same as those drinking 40-74 g/day.
C_{ix}	P(if heavy drinker, Epilepsy and status epilepticus)	0.180%	These were obtained by applying the following parameters to the formula set out at the beginning of this table (Table 2): ▪ Prevalence of the disease in the population aged 55 – 64 years old (D=0.073%). Data from NICE - Commissioning Guidelines. "Assumptions used in estimating a population benchmark". http://www.nice.org.uk/usingguidance/commissioningguides/epilepsiesinadults/determininglocalservicelevels/AssumptionsPopulationBenchmark.jsp ▪ Relative risk (RR heavy drinkers =7.08; RR moderate drinkers=2.33; RR non-drinkers=1). RR calculations have been based on weighted average RR scores based on different population with each drinking level. (Males1-19g/day = 1.23, Males40-74g/day = 6.83, Males75+g/day = 6.83, 0g/day = 1, Females1-19g/day = 1.34, Females20-39g/day = 7.22, Females40-74g/day = 7.52, Females75+g/day = 7.52). Based on RR from University of Sheffield (2008), with the exception of those drinking over 75 g/day. Data was not available and therefore RR was assumed to be the same as those drinking 40-74g/day.
D_{ix}	P(if moderate drinker, Epilepsy and status epilepticus)	0.059%	
E_{ix}	P(if non-drinker, Epilepsy and status epilepticus)	0.025%	
C_{x}	P(if heavy drinker, Hypertensive diseases)	3.489%	These were obtained by applying the following parameters to the formula set out at the beginning of this table (Table 2): ▪ Prevalence of the disease in the population aged 55 – 64 years old (D=2.102%). Based on number of hospital admissions from University of Sheffield (2008). ▪ Relative risk (RR heavy drinkers =2.22; RR moderate drinkers=1.20; RR non-drinkers=1). RR calculations have been based on weighted average RR scores based on different population with each drinking level. (Males1-19g/day = 1.15, Males40-74g/day = 2.04, Males75+g/day = 4.15, 0g/day = 1, Females1-19g/day = 1.15, Females20-39g/day = 1.43, Females40-74g/day = 2.04, Females75+g/day = 4.15). Based on RR from University of Sheffield (2008).
D_{x}	P(if moderate drinker, Hypertensive diseases)	1.877%	
E_{x}	P(if non-drinker, Hypertensive diseases)	1.569%	

Ref	Description	Value	Calculation and source
C_{xi}	P(if heavy drinker, Ischaemic Heart Disease)	17.186%	These were obtained by applying the following parameters to the formula set out at the beginning of this table (Table 2): ▪ Prevalence of the disease in the population aged 55 – 64 years old (D=14.622%). http://www.wrongdiagnosis.com/i/ischemic_heart_disease/prevalence.htm and applied to UK population. ▪ Relative risk (RR heavy drinkers =1.08; RR moderate drinkers=0.84; RR non-drinkers=1) RR calculations have been based on weighted average RR scores based on different population with each drinking level. (Males1-19g/day = 0.82, Males40-74g/day = 0.98, Males75+g/day = 1.53, 0g/day = 1, Females1-19g/day = 0.85, Females20-39g/day = 0.90, Females40-74g/day = 1.10, Females75+g/day = 1.87). Based on RR from University of Sheffield (2008).
D_{xi}	P(if moderate drinker, Ischaemic Heart Disease)	13.304%	
E_{xi}	P(if non-drinker, Ischaemic Heart Disease)	15.862%	
C_{xii}	P(if heavy drinker, Cardiac arrhythmias)	8.533%	These were obtained by applying the following parameters to the formula set out at the beginning of this table (Table 2): ▪ Prevalence of the disease in the population aged 55 – 64 years old (D=5.827%). http://www.wrongdiagnosis.com/a/arrhythmias/prevalence.htm and applied to UK population. ▪ Relative risk (RR heavy drinkers =2.23; RR moderate drinkers=1.51; RR non-drinkers=1) RR calculations have been based on weighted average RR scores based on different population with each drinking level. (Males1-19g/day = 1.51, Males40-74g/day = 2.23, Males75+g/day = 2.23, 0g/day = 1, Females1-19g/day = 1.51, Females20-39g/day = 2.23, Females40-74g/day = 2.23, Females75+g/day = 2.23). Based on RR from University of Sheffield (2008), with the exception of those drinking over 75 g/day. Data was not available and therefore RR was assumed to be the same as those drinking 40-74 g/day.
D_{xii}	P(if moderate drinker, Cardiac arrhythmias)	5.778%	
E_{xii}	P(if non-drinker, Cardiac arrhythmias)	3.827%	
C_{xiii}	P(if heavy drinker, Haemorrhagic stroke)	0.316%	These were obtained by applying the following parameters to the formula set out at the beginning of this table (Table 2): ▪ Prevalence of the disease in the population aged 55 – 64 years old (D=0.188%). Ninewells Hospital and Medical School ▪ Relative risk (RR heavy drinkers =2.14; RR moderate drinkers=1.11; RR non-drinkers=1) RR calculations have been based on weighted average RR scores based on different population with each drinking level (Males1-19g/day = 1.10, Males40-74g/day = 1.82, Males75+g/day = 4.7, 0g/day = 1, Females1-19g/day = 1.10, Females20-39g/day = 1.19, Females40-74g/day = 1.82, Females75+g/day = 4.7). Based on RR from University of Sheffield (2008).
D_{xiii}	P(if moderate drinker, Haemorrhagic stroke)	0.164%	
E_{xiii}	P(if non-drinker, Haemorrhagic stroke)	0.147%	

Ref	Description	Value	Calculation and source
C_{xiv}	P(if heavy drinker, Ischaemic stroke)	0.171%	These were obtained by applying the following parameters to the formula set out at the beginning of this table (Table 2): ▪ Prevalence of the disease in the population aged 55 – 64 years old (D=0.106%). Ninewells Hospital and Medical School ▪ Relative risk (RR heavy drinkers =1.68; RR moderate drinkers=0.86; RR non-drinkers=1) RR calculations have been based on weighted average RR scores based on different population with each drinking level. (Males1-19g/day = 0.85, Males40-74g/day = 1.17, Males75+g/day = 4.37, 0g/day = 1, Females1-19g/day = 0.85, Females20-39g/day = 0.9, Females40-74g/day = 1.17, Females75+g/day = 4.37). Based on RR from University of Sheffield (2008).
D_{xiv}	P(if moderate drinker, Ischaemic stroke)	0.088%	
E_{xiv}	P(if non-drinker, Ischaemic stroke)	0.102%	
C_{xv}	P(if heavy drinker, Oesophageal varices)	0.034%	These were obtained by applying the following parameters to the formula set out at the beginning of this table (Table 2): ▪ Prevalence of the disease in the population aged 55 – 64 years old (D=0.012%). Based on hospital admissions from University of Sheffield (2008). ▪ Relative risk (RR heavy drinkers =9.30; RR moderate drinkers=2.11; RR non-drinkers=1) RR calculations have been based on weighted average RR scores based on different population with each drinking level. (Males1-19g/day = 1.95, Males40-74g/day = 7.13, Males75+g/day = 26.53, 0g/day = 1, Females1-19g/day = 1.95, Females20-39g/day = 2.9, Females40-74g/day = 7.13, Females75+g/day = 26.53). Based on RR from University of Sheffield (2008).
D_{xv}	P(if moderate drinker, Oesophageal varices)	0.008%	
E_{xv}	P(if non-drinker, Oesophageal varices)	0.004%	
C_{xvi}	P(if heavy drinker, Unspecified liver disease)	0.982%	These were obtained by applying the following parameters to the formula set out at the beginning of this table (Table 2): ▪ Prevalence of the disease in the population aged 55 – 64 years old (D=0.335%). http://www.wrongdiagnosis.com/c/cirrhosis_of_the_liver/prevalence.htm ▪ Relative risk (RR heavy drinkers =9.30; RR moderate drinkers=2.11; RR non-drinkers=1) RR calculations have been based on weighted average RR scores based on different population with each drinking level. (Males1-19g/day = 1.95, Males40-74g/day = 7.13, Males75+g/day = 26.53, 0g/day = 1, Females1-19g/day = 1.95, Females20-39g/day = 2.9, Females40-74g/day = 7.13, Females75+g/day = 26.53). Based on RR from University of Sheffield (2008).
D_{xvi}	P(if moderate drinker, Unspecified liver disease)	0.222%	
E_{xvi}	P(if non-drinker, Unspecified liver disease)	0.106%	
C_{xvii}	P(if heavy drinker, Cholelithiasis)	0.171%	These were obtained by applying the following parameters to the formula set out at the beginning of this table (Table 2): ▪ Prevalence of the disease in the population aged 55 – 64

Ref	Description	Value	Calculation and source
D_{xvii}	P(if moderate drinker, Cholelithiasis)	0.242%	years old (D=0.244%). Based on hospital admissions from University of Sheffield (2008). ▪ Relative risk (RR heavy drinkers =0.56; RR moderate drinkers=0.80; RR non-drinkers=1) RR calculations have been based on weighted average RR scores based on different population with each drinking level. (Males1-19g/day = 0.82, Males40-74g/day = 0.5, Males75+g/day = 0.5, 0g/day = 1, Females1-19g/day = 0.82, Females20-39g/day = 0.68, Females40-74g/day = 0.5, Females75+g/day = 0.5). Based on RR from University of Sheffield (2008) with the exception of those drinking over 75 g/day. Data was not available and therefore RR was assumed to be the same as those drinking 40-74 g/day.
E_{xvii}	P(if non-drinker, Cholelithiasis)	0.304%	
C_{xviii}	P(if heavy drinker, Psoriasis)	4.959%	These were obtained by applying the following parameters to the formula set out at the beginning of this table (Table 2): ▪ Prevalence of the disease in the population aged 55 – 64 years old (D=3.789%). http://www.wrongdiagnosis.com/p/psoriasis/prevalence.htm ▪ Relative risk (RR heavy drinkers =1.99; RR moderate drinkers=1.58; RR non-drinkers=1) RR calculations have been based on weighted average RR scores based on different population with each drinking level. (Males1-19g/day = 1.58, Males40-74g/day = 2.2, Males75+g/day = 2.2, 0g/day = 1, Females1-19g/day = 1.58, Females20-39g/day = 1.6, Females40-74g/day = 2.2, Females75+g/day = 2.2) Based on RR from University of Sheffield (2008) with the exception of those drinking over 75 g/day. Data was not available and therefore RR was assumed to be the same as those drinking 40-74 g/day.
D_{xviii}	P(if moderate drinker, Psoriasis)	3.944%	
E_{xviii}	P(if non-drinker, Psoriasis)	2.491%	

Table 3. Associated outcomes (monetary values in £2007/08)

Ref	Outcome	Value	Calculation and source
All lifetime treatment cost calculations were based on the present value of the annual treatment cost through the expected duration of the disease. The duration of the disease was assumed to be given by the difference between the average onset and mortality ages for the disease. The onset age of the disease was assumed 55 years old. Total treatment costs were discounted to the age of individuals receiving the intervention, which was assumed 45 years old, at a 3.5% annual rate.			
b_i	Malignant neoplast of lip, oral cavity and pharynx costs	£20,573	The annual treatment of head and neck cancer cost was £12,325. This is based on NICE Guidance on Cancer services and the number of annual cases. The mortality age is assumed to be equal for all head and neck cancer and an average mortality of 64.6, as reported by Jay F. Piccirillo and Irene Costas.

Ref	Outcome	Value	Calculation and source
b_{ii}	Malignant neoplast of oesophagus cost	£20,573	The annual treatment of head and neck cancer cost was £12,325. This is based on N ICE Guidance on Cancer services and the number of annual cases. The mortality age is assumed to be equal for all head and neck cances and an average mortality of 64.6, as reported by Jay F. Piccirillo and Irene Costas.
b_{iii}	Malignant neoplast of colon cost	N/A	Data on costs was not available and the treatment cost savings have been excluded from the modelling.
b_{iv}	Malignant neoplast of rectum cost	N/A	Data on costs was not available and the treatment cost savings have been excluded from the modelling.
b_{v}	Malignant neoplast of liver and bile cost	N/A	Data on costs was not available and the treatment cost savings have been excluded from the modelling.
b_{vi}	Malignant neoplast of larynx cost	£20,573	The annual treatment of head and neck cancer cost was £12,325. This is based on N ICE Guidance on Cancer services and the number of annual cases. The mortality age is assumed to be equal for all head and neck cances and an average mortality of 64.6, as reported by Jay F. Piccirillo and Irene Costas.
b_{vi}	Malignant neoplast of breast cost	£16,859	The annual treatment cost was estimated using Programme Budget data for 2006/07 was £2,381. The average mortality age is 67.5, based on a report from the Association of Occupation and Breast Cancer Mortality in the State of Vermont.
b_{vii}	Diabetes mellitus (Type II) cost	£36,622	The annual treatment cost is estimated as £3,213 and the average mortality age is 79.05, as reported by Matrix (2006).
b_{viii}	Epilepsy and status epilepticus cost	£46,250	The annual treatment cost is estimated as £3,989 based on Gay Frankenfield, RN, WebMD Health News (2000), and the average mortality age is 79.7. This was assumed to be the same as the national average age of mortality for people currently 45.
b_{ix}	Hypertensive diseases cost	£16,639	The annual treatment cost was estimated by University of York (2007) at £1511 (in £2007/08) based on data provided by the British Heart Foundation (2003). The average mortality age is 77.3 for men and 79.3 for women, as reported by Matrix (2006).
b_{x}	Ischaemic Heart Disease cost	£16,639	The annual treatment cost was estimated by Matrix (2006) at £1,511 (in £2007/08) based on data from the British Heart Foundation. The average mortality was assumed to increase with the onset age of the disease. The average mortality age is 77.3 for men and 79.3 for women, as reported by Matrix (2006).

Ref	Outcome	Value	Calculation and source
b_{xi}	Cardiac arrhythmias cost	£16,639	The annual treatment cost was estimated by Matrix (2006) at £1,511 (in £2007/08) based on data from the British Heart Foundation. The average mortality was assumed to increase with the onset age of the disease. The average mortality age is 77.3 for men and 79.3 for women, as reported by Matrix (2006).
b_{xii}	Haemorrhagic stroke cost	£20,017	The annual treatment cost was estimated by Matrix (2006) at £2,194 (in £2007/08) based on data from the Department of Health. The average mortality age is 72.4 for both men and women, as reported by Matrix (2006).
b_{xiii}	Ischaemic stroke cost	£20,017	The annual treatment cost was estimated by Matrix (2006) at £2,194 (in £2007/08) based on data from the Department of Health. The average mortality age is 72.4 for both men and women, as reported by Matrix (2006).
b_{xiv}	Oesophageal varices cost	NA	Data on costs was not available and the treatment cost savings have been excluded from the modelling.
b_{xv}	Unspecified liver disease cost	NA	Data on costs was not available and the treatment cost savings have been excluded from the modelling.
b_{xvi}	Heart failure cost	£16,639	The annual treatment cost was estimated by Matrix (2006) at £1,511 (in £2007/08) based on data from the British Heart Foundation. The average mortality was assumed to increase with the onset age of the disease. The average mortality age is 77.3 for men and 79.3 for women, as reported by Matrix (2006).
b_{xvii}	Cholelithiasis cost	NA	Data on costs was not available and the treatment cost savings have been excluded from the modelling.
b_{xviii}	Psoriasis cost	£17,159	The annual treatment cost is £1,480 as reported by Marchetti A (2005) in the NHS Economic Evaluation Database, and converted into sterling based on a conversion of $0.6059 to £1. The average mortality age is79.7, ie individual's mortality is the same as the national profile.
C1	QALYs: reduced alcohol consumption	0.32	The QALYs for reduced alcohol consumption are shown for heavy drinkers becoming moderate drinkers. These are calculated based on utility data from University Sheffield (2008).

Effectiveness evidence

A literature review was undertaken by Bazian to identify evidence on the effectiveness and cost-effectiveness of brief interventions delivered in GP surgeries to reduce levels of alcohol consumption. Further details are available on the evidence methods page of the ***H.E.L.P.*** website.

The review of the evidence on the effectiveness of brief interventions delivered in GP surgeries identified five reviews of which two were considered relevant. Table 4 provides the following details of the studies identified:

- Population
- Intervention
- Results

The review of the evidence on the cost-effectiveness of brief interventions delivered in GP surgeries identified five cost effectiveness studies. Table 5 provides the following details of the studies identified:

- Population, intervention and model
- Perspective, discounting, inflation, cost year
- Utility/benefit
- Unit costs
- Efficiency

Table 6 and Table 7 provide a quality assessment of the effectiveness and cost-effectiveness studies. Further details are available on the quality appraisal methods page.

The following criteria were applied to select effectiveness evidence for undertaking the economic analysis:

- Location. Studies from the UK were preferred over studies from other locations.
- Population. Studies applied to the general population were preferred over studies applied to restricted population groups (e.g. pregnant women; individuals from specific communities/nationalities).
- Counterfactual. Studies for which the counterfactual intervention was ‘usual care’ or ‘do nothing’ in a UK setting were preferred over studies for which the counterfactual was different from ‘usual care’ or ‘do nothing’.
- Method. Studies using more rigorous design methods (e.g. randomised control trials or quasi experimental designs with regression models controlling for confounders) were preferred over studies using less rigorous design methods (e.g. before-after studies or simple correlation analysis).

Table 4. Effectiveness of brief interventions delivered in GP surgeries to reduce problem drinking

Study reference	Population	Intervention	Results
Evidence – effectiveness and cost-effectiveness – is extracted from 5 studies. Three of these were found by the initial systematic review for the Scottish Executive and a further two were deemed relevant studies in the update of this review. We have supplemented the effectiveness data by providing results from Cochrane review and meta-analysis of brief alcohol interventions in a primary care setting.			
Fleming et al, 2002; ▪ randomised controlled trial and parallel cost-benefit analysis	774 patients aged 18 to 65 years who were attending routine general practice appointments and drinking above threshold limits (men >14 drinks and women >11 drinks per week)	*Intervention* ▪ Project TrEAT - physician advice in general practice regarding problem drinking. Intervention involved receiving a booklet, a workbook of current health behaviour, a review of prevalence of problem drinking, a list of adverse effects of alcohol, a worksheet on drinking cues, a drinking agreement (prescription and drinking diary cards) - intervention consisted of two 15 minute appointments a month apart. Patients received a follow-up call from a clinic nurse 2 weeks after each GP meeting *Control* ● A booklet on general health issues	*At 48 months:* ▪ Change in frequency of binge drinkers (>5 drinks in previous 30 days) over time from baseline: -21.2% with treatment v - 16.5% with control; p<0.001 ▪ Change in frequency of heavy drinkers over time: -24.3% with treatment v -22.8% with control; p<0.001 Review reports that the average number of drinks in the past 7 days declined by 39.5% at 6 months and 40.0% at 12 months. Binge drinking reduced by 49.1% (6 months) and 45.7% (12 months), which was reported by the review to be significantly greater than the reduction in the control group.

Study reference	Population	Intervention	Results
Kaner et al, 2007; ▪ systematic review	Participants were visiting a primary health care clinic or A&E department for any non-alcohol related issue. Heavily alcohol dependent people or those currently or recently receiving treatment for alcohol abuse/misuse were usually excluded	*Intervention* ▪ Brief interventions (ranging from a single session up to maximum of 4 sessions) which involved any or all of motivational interviews, CBT, action plans, leaflets (general or specific), drinking diaries, personalised feedback, telephone counselling, home exercises designed to achieve a reduction in risky alcohol consumption or alcohol-related problems; median treatment duration was 25 minutes (ranging from 5 to 60 minutes) *Control* ▪ Three categories of control treatment; some no intervention, some usual care (GP advice to cut down drinking), some information leaflets	Quantity of alcohol consumed per week (1 year): WMD g/wk: -33.35 (95% CI -53.62 to 13.07)
Freeborn, 2000; USA ▪ randomised controlled trial with parallel cost study	Moderate to heavy drinkers in a large group-model HMO.	*Intervention* ▪ brief intervention consisting of brief advice from the primary care provider to reduce drinking, followed by a 15-minute motivational session with a trained counsellor *Control* ▪ usual care	At 3 months: ▪ Total standard drinks in the previous three months: 176 with intervention vs. 216 with control, p=0.04 ▪ Drinking days per week: 2.8 with intervention vs. 3.3 with control, p=0.02 At 12 months: ▪ No difference in total standard drinks or drinks per drinking day ▪ Drinking days per week: 2.7 with intervention vs. 3.1 with control, p=0.04

Table 5. Cost-effectiveness of brief interventions delivered in GP surgeries to reduce problem drinking

Study reference	Population, intervention and model	Perspective, discounting, inflation, cost year	Utility/benefit	Unit costs	Efficiency
Ludbrook conducted a systematic review of the cost-effectiveness of brief intervention for the Scottish Executive. These are the basis for the data extraction of this intervention. The original review found 2 cost effectiveness studies; the update found 5 (one of which was a longer term follow up of a study in the original review). Three of the five new studies found in the update were deemed irrelevant; one (Hulse and Tait, 2003) because it assessed the effectiveness of an intervention in an inpatient psychiatric setting, the second (Shakeshaft, 2002) because it assessed an intervention in an outpatient community based drugs and alcohol setting and the third (Sobell et al 2002) because it assessed the effects of a mailed intervention of drinking guidelines or personalised feedback.					
Fleming et al, 2002; USA ▪ benefit-cost analysis based on above study	Benefit-cost analysis based on the above study: 774 patients aged 18 to 65 years who were attending routine general practice appointments and drinking above threshold limits (men >14 drinks and women >11 drinks per week) Project TrEAT - physician advice in general practice regarding problem drinking. Intervention involved receiving a booklet, a workbook of current health behaviour, a review of prevalence of problem drinking, a list of adverse effects of alcohol, a worksheet on drinking cues, a drinking agreement (prescription and drinking diary cards) - intervention consisted	▪ Medical and social perspective ▪ No discounting ▪ No adjustment for inflation ▪ Cost year: USD1993	Benefits of avoided health services utilization: $920/day of hospitalisation and $458 per emergency department visit Benefits from reductions in legal events and motor vehicle accidents were estimated from a separate study – Miller et al, 1996	$205 per patient Total economic cost $80, 210	*Based on results from 48 month follow-up:* ▪ Total net benefit per patient: $7780 (CI $894 to $14,668) ▪ Health benefit (net) per patient: $546 (95% CI -$71 to $1164) ▪ Healthcare savings per patient: At 48 months: $712 per patient savings in emergency room visits and hospital use ▪ Combining total economic costs and benefits, benefit-cost ratio is 39:1 (95% CI 5.4 to 72.5) ▪ Health care system only: 4.3:1 (95% CI 0.6 to 8.0)

Study reference	Population, intervention and model	Perspective, discounting, inflation, cost year	Utility/benefit	Unit costs	Efficiency
	of two 15 minute appointments a month apart. Patients received a follow-up call from a clinic nurse 2 weeks after each GP meeting versus a booklet on general health issues				
Wutzke et al, 2001; Australia ▪ primary effectiveness study on which this model is based is not extracted due to pragmatic difficulties with retrieval: Gomel, M., Saunders, J.B., Burns, L., Hardcastle, D., & Sumich, M. (1994). Dissemination of early intervention for harmful alcohol consumption in general practice. Health Promotion Journal of Australia, 4, 65-69)]	*Cost-effectiveness study based on extrapolation of results of an RCT (not extracted here) to national population:* ▪ No support group (5 minutes of initial training with no further contact or support) ▪ Maximal support group (5 minutes training plus alternate telephone and personal visits every 2 weeks) ▪ Control group (no initial training or on-going support) Direct costs of providing alcohol treatment programme in primary care examined (including costs of marketing WHO's Drink-less package to	▪ Health perspective ▪ 3% discounting ▪ Unclear whether adjusted for inflation ▪ Cost year: AusD1996	LYS: ▪ 674 in control ▪ 1285 in no support ▪ 1972 in maximal support	*Total cost per GP* ▪ Control: 212.61 ▪ No support: 401.91 ▪ Maximal support: 688.03 *Cost per patient counselled* ▪ Control: 21.26 ▪ No support: 19.14 ▪ Maximal support: 21.50 *Recruitment* ▪ Control: 5.35 ▪ No support: 5.35 ▪ Maximal support: 5.35 *Training* ▪ Control: 35.56 ▪ No support: 44.66 ▪ Maximal support: 138.68 *Counselling*	Average cost per life year saved compared with control: AUS$ 1223 for minimal support AUS$1873 for maximal support

Study reference	Population, intervention and model	Perspective, discounting, inflation, cost year	Utility/benefit	Unit costs	Efficiency
	Ps, training and support costs, cost of counselling at risk drinkers)			▪ Control: 171.70 ▪ No support: 351.90 ▪ Maximal support: 544.00	
Lindholm, 1998; Sweden ▪ cost modelling study	Economic evaluation of alcohol advice in primary care, based on a model estimating effectiveness from controlled trials combined with observations from long-term epidemiological studies. Intervention of primary care advice to reduce individual's drinking from a 'high' to a 'moderate' level. GP and nurse advice are modelled	▪ Health perspective ▪ 5% discounting ▪ Unclear whether adjusted for inflation ▪ Cost year unclear	Heavy drinkers gain 3.7 years of life on average if they reduce their consumption of alcohol before the age of 40	*Cost of intervention per patient* ▪ CAGE screening: 120ECU ▪ GP visit: 130ECU ▪ Visit to district nurse: 40ECU ▪ GT tests: 1ECU	▪ Scenario 1: 200ECU (£123.50) per LYS for 25 visit intervention ▪ Scenario 2: 144,000ECU (£88,900) per LYS for 25 visit intervention
Freeborn, 2000; USA ▪ randomised controlled trial with parallel healthcare utilisation tudy	At-risk drinkers in HMO outpatient waiting rooms randomly assigned to usual care or brief clinician advice plus a 15-minute motivational counselling session.	▪ Health perspective ▪ Discounting not reported ▪ Inflation not reported ▪ Cost year unclear	NS	NS	Health care utilisation no different between intervention and control arms
Storer, 2003; UK ▪ cost-benefit analysis based on a retrospective case series to assess costs of admissions	Retrospective review of all patients admitted to the Naval Medical Center Portsmouth between October 1, 2000 and September 30, 2001 with substance abuse as their diagnosis. Average age 33 years, 71% male. Data file on	▪ Health perspective ▪ Unclear discounting ▪ Unclear whether adjusted for inflation ▪ USD2001	Benefit of $1,096 per person in reduced costs over a 1 year period	Total sample: cost of first admission (6.8 days): $12,410.93 cost of second admission (8.5 days): $17,934.31 cost of third admission (12.4 days): $21,718.82	Cost avoidance opportunity of $713,372.40 Lower readmission rate associated with brief interventions represents a benefit of $606,366.54 saved at a cost of

Study reference	Population, intervention and model	Perspective, discounting, inflation, cost year	Utility/benefit	Unit costs	Efficiency
	each patient included number of admissions during the study period, length of stay, whether patient received brief intervention or not and cost code of the hospital service. Length of stay data was used to estimate costs of intervention			Unit cost of addiction medical services: $153.70 per intervention	$31,508.50

Table 6. Quality assessment for meta-analysis studies

Study reference	QA for meta-analysis			Score	Grading (++ 3; + 2; -1)
	Search and inclusion criteria?	Quant data each study?	Assessment of quality data?		
Kaner et al, 2007	Yes	Yes	Yes	3	++

Table 7. Quality assessment for effectiveness studies

Study reference	QA for trials/RCTs					Score	Grading (++ 4-5; + 3; -0-2)
	Follow-up	Intention to treat?	Attrition	Groups similar or controlled?	Randomised?		
Fleming et al, 2002; USA	Yes	Don't know	Yes	Yes	Yes	4	++
Freeborn, 2000; USA	Yes	Yes	Don't know	Yes	Yes	4	++

Table 8. Quality assessment for economic studies

Study reference	QA for economic studies						Score	Grading (++ 4-6; + 3; -0-2)
	All costs of intervention included?	Market values used for costs?	Perspective reported?	Sensitivity analysis?	Reports base year adopted?	Effectiveness data from RCT or MA?		
Fleming 2002; USA	Yes	Yes	Yes	No	Yes	Yes	5	++
Wutzke 2001; Australia	Yes	Don't know	Yes	Yes	Yes	Yes	5	++
Lindholm 1998; Sweden	Don't know	Don't know	Yes	Yes	No	Yes	3	+
Freeborn, 2000; USA	Don't know	Don't know	Yes	No	No	Yes	2	-
Storer, 2003; UK	Yes	Don't know	Yes	No	Yes	No	3	+

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