
NICE

# Supplementary economic analysis on interventions to reduce health inequalities

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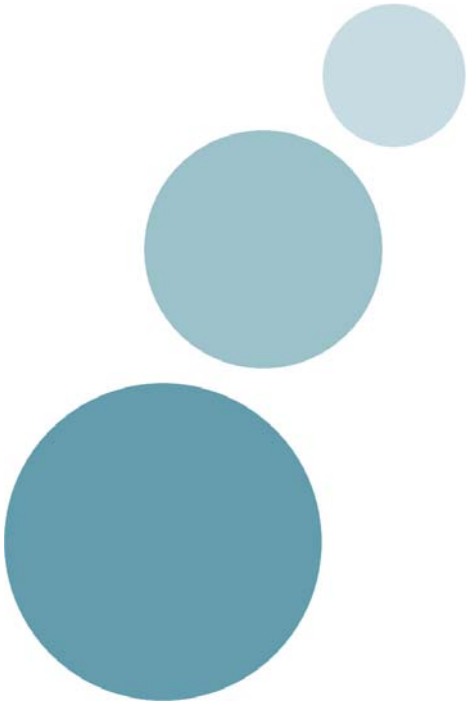

# Contents

## Executive Summary

This report, prepared jointly between Matrix and the NICE secretariat, presents an economic analysis undertaken as a supplement to that undertaken by The Matrix Knowledge Group on the cost-effectiveness of interventions to improve statin use and smoking cessation among disadvantaged groups. The supplement has been prepared to answer a number of questions relating to four economic analysis reports produced by The Matrix Knowledge Group in January 2008. (2008a, b, c, d). The questions had been posed by the Public Health Interventions Advisory Committee (PHIAC) of NICE, at its first meeting to discuss this topic.

An intervention for a disadvantaged group will have two cost components: a "treatment" cost, which will include standard costs of allowing the public access to the treatment, and an additional "finding" cost for ensuring similar access levels among the disadvantaged group in question, where "finding" includes the additional costs of maintaining contact and compliance.

As a result of the intervention, there will be a QALY gain.

The outcomes for cost effectiveness ideally are therefore:

- cost of treatment per QALY
- cost of finding per QALY
- total cost per QALY

### *Statins*

For statins, it was possible to use this model. The cost per QALY for "treating" an eligible person for secondary prevention with a generic statin in both the general population and in disadvantaged populations was estimated to be £900 per QALY, and there was an additional cost per QALY of "finding" the members of the disadvantaged groups, estimated to be a further £3,100. For primary prevention the cost per QALY gained of improving access to statins ranged from an estimated £660 to £122,000, and the cost per QALY gained of treating with statins was estimated to be £3,600.

### *Smoking Cessation*

The studies of smoking cessation did not allow this kind of analysis except in one case. The analysis suggests that the following interventions targeted at disadvantaged groups have a cost per QALY gained lower than a £20,000 threshold, and are thus cost-effective:

- Social marketing interventions.
- Workplace interventions.
- Brief interventions and proactive telephone counselling for pregnant women.
- Recruitment in a paediatric unit.
- Pharmacist-based interventions.
- Free NRT.
- NHSSSS.

The analysis also provides estimates of the cost per QALY gained for some of these interventions when targeted at the general population, including:

- Social marketing when targeted at the general population had a cost per QALY gained of £65. This compared with a cost per QALY gained when targeted at disadvantaged groups of between £420 and £6,400.
- Pharmacist-based interventions. The cost per QALY gained for pharmacist interventions is £438-£655 when targeted at the general population and £1,030 when targeted at disadvantaged groups.
- Free NRT: The cost per QALY gained of free NRT is £45-£671 when targeted at the general population and £1,627 when targeted at disadvantaged groups.

# 1.0 Introduction

This report, prepared jointly between Matrix and the NICE secretariat, presents an economic analysis undertaken as a supplement to that undertaken by The Matrix Knowledge Group on the cost-effectiveness of interventions to improve statin use and smoking cessation among disadvantaged groups. The supplement has been prepared to answer a number of questions relating to four economic analysis reports produced by The Matrix Knowledge Group in January 2008. (2008a, b, c, d). The questions had been posed by the Public Health Interventions Advisory Committee (PHIAC) of NICE, at its first meeting to discuss this topic. PHIAC requested further health economics work should be carried out on:

- *Explaining the assumptions behind the models in more detail*
- *Ensuring consistency of findings across other NICE guidance*
- *Whether the studies used are talking about similar groups*
- *The appropriateness of prioritising strategies/interventions which lie under the NICE threshold*
- *Whether studies have used the 'usual care' comparator.*

Examining these items entailed a detailed scrutiny of the four reports, which has led to some adjustments to the results of the models over and above those requested by PHIAC. None of the changes, taken singly or in aggregate, however, is at all likely to materially alter any of the decisions that PHIAC has provisionally arrived at in respect of the Guidance on this topic.

This report is in two parts. The first part answers the five points made by PHIAC and the second part consolidates the changes made as a result of these considerations into a new set of results for each study.

A comprehensive discussion of the background to this work and the economic models developed for this analysis can be found in the four reports produced by Matrix.

# 2.0 Part I: Answering PHIAC's questions

*a Explaining the models in more detail*

In simplified form, there is an additional cost of ensuring that disadvantaged groups gain an equal access to NHS services, over and above the cost of doing so for the non-disadvantaged population. "Equal access" includes recognising and finding people from disadvantaged groups, ensuring initial and continuing contact with NHS services where necessary, and improving compliance.

An intervention for a disadvantaged group will have two cost components: a "treatment" cost, which will include standard costs of allowing the public access to the treatment, and an

additional "finding" cost for ensuring similar access levels among the disadvantaged group in question, where "finding" includes the additional costs of maintaining contact and compliance. As a result of the intervention, there will be a QALY gain.

The outcomes for cost effectiveness ideally are therefore:

1. cost of treatment per QALY
2. cost of finding per QALY
3. total cost per QALY

For the general population, item 2 is defined as zero and thus for this population, items 1 and 3 are the same. For disadvantaged populations, we assume that item 1 has the same cost as for the general population and that there is an additional cost for item 2. This assumption may not always hold, sometimes because disadvantaged groups have a greater extent of co-morbidities and sometimes (e.g. for smoking cessation) there are social reasons for the relative lack of success of an intervention among many disadvantaged groups. However, it is difficult to model a different treatment cost per QALY in the face of poor and sometimes contradictory evidence.

For the two interventions considered, it has proved possible to use this model. However, for smoking cessation, lack of data has allowed this approach to be used only in the work of Hennrikus et al (2002). Even in this case, this approach has suffered because full costings were not available. In general, therefore, for smoking cessation, the approach taken has been to compare item 3 for a number of disparate studies of disadvantaged groups with item 3 for a number of separate and disparate studies for the general population. This approach has the advantage that item 1 for disadvantaged groups might be greater than that for the general population, and thus circumvents the need to assume that item 1 is the same for both groups. However, because of the heterogeneity of the studies both within and between the two groups, the resulting comparison must be taken as no more than indicative of a general order of magnitude.

This last point also answers part (c) of the additional work posed by PHIAC: *Whether the studies used are talking about similar groups*

*b Ensuring consistency of findings across other NICE guidance*

To the extent that they can be compared, the findings of the model are broadly consistent with those of drugs for smoking cessation (technology appraisals) and statins (technology appraisals and clinical guidelines). The cost per life year gained – which is somewhat higher than the cost of a QALY when applied to smoking cessation – for NRT or bupropion in technology appraisal 39 was less than £2,500 when conducted with brief advice and less than £1,000 when accompanied by counselling. The statins analysis for the Matrix work is underpinned by the results of modelling undertaken for NICE's Technology Appraisal 94 on statins (Ward, 2005). Ward's work was also used to inform the NICE clinical guideline on Lipid Modification (expected publication date May 2008).

*c Whether the studies used are talking about similar groups*

See the last part of the answer to part a above.

*d The appropriateness of prioritising strategies/interventions which lie under the NICE threshold*

All comparisons for adjacent points on the cost-effect envelope that are less than £20,000 per QALY are good value for money compared with the marginal project within the NHS. If we consider the disadvantaged to be a separate population (or several separate populations) with its own cost-effect plane (or their own cost-effect planes) we do not need to consider the incremental cost effectiveness of a disadvantaged population compared with a general population. Since all the relevant ICERs for such disadvantaged groups are well under £20,000, then the interventions looked at would all be cost effective and should therefore normally be recommended. However, should commissioning budgets require choices to be made between different interventions judgements about equity will need to be made whenever the ICER for the disadvantaged population is higher than that of the general population. As estimated in this report and the preceding four Matrix reports, ICERs for disadvantaged populations are still far lower than £20,000 per QALY gained. In order to make judgements about which interventions (and thus populations) to prioritise consideration must be given to whether the loss of efficiency (by using less resources for smoking cessation for the general population and more for the disadvantaged population) is more than compensated by a drive towards greater equity. It is not a decision that can be decided by formulae in the way that a decision about cost effectiveness can.

If locally, a separate budget is set aside which would require a choice to be made between services for the general population and for disadvantaged groups even when the cost per QALY for both groups is so low, the budget for these items should be increased to allow both groups to be funded. Not to do that would not optimise the health gain for that community.

*e Whether studies have used the 'usual care' comparator.*

A number of studies did not measure the counterfactual (see section 3.1 for further detail on how these studies were incorporated into the analysis) or did not report what the counterfactual was (generally because the data was extracted from a review study where such details were not available). Of those studies that did measure and report the counterfactual, the majority of the studies used 'usual care' as the comparator. However, it is important to note that a number of studies were not based in the UK and may thus not reflect 'usual care' in the UK.

A number of smoking cessation studies used non-'usual care' comparator group, including:

- Altman et al (1987) and Elder et al (1987) who compared quit to win against attending cessation classes or being provided with self-help guidance.
- Bauer et al (2006) who compared adverts for free NRT against adverts for self-help kits.

- Hall et al (2003) who compared an extended stop-smoking leaflet against a brief stop-smoking leaflet.
- Hennrikus et al (2002) who compared workplace smoking cessation interventions with incentives against workplace smoking cessation interventions without incentives.
- Rimmer et al (1994) and Zhu et al (1996) who compared telephone counselling against self-help guidance.

# 3.0 Part II: Consolidating the changes to the models

## 3.1 Method

A number of updates were made to the methodology described in the original analysis reports (Matrix 2008a, b, c, d). This section summarises these updates and divides them into the following three types:

1. Those pertinent to models of both interventions to increase smoking cessation and interventions to promote the use of statins.
2. Those pertinent to models of just smoking cessation interventions.
3. Those pertinent to models of just statins interventions.

### 3.1.1 Analysis of both smoking cessation and statins interventions

Two generic updates are made to the models of both smoking cessation and statins interventions. First, the estimate of the cost of getting someone to access an intervention has been changed to the cost per QALY of getting someone to access an intervention. The cost per QALY gained estimates produced by the original analysis comprised two elements: the cost per *person* of getting somebody to access the intervention; and the cost per QALY gained of being "treated" by the intervention. However, a better reflection of the cost per QALY gained of ensuring that somebody accesses an intervention would comprise the following two elements: the cost per *QALY* gained of getting someone to access an intervention; and the cost per QALY gained of being treated by the intervention.

Equation (1) represents the cost per QALY gained estimate produced by the original analysis for the example of nicotine replacement therapy (NRT) for smoking cessation.

£/QALY = (Cost access NRT/person accessed) + (Cost NRT/QALY gained) (1)

Equation (2) represents the cost per QALY gained estimate produced by the updated analysis for the example of NRT for smoking cessation.

£/QALY = (Cost access NRT/QALY gained) + (Cost NRT/QALY gained) (2)

A second adjustment was made to models of both smoking cessation and statins interventions to reflect the status of the counterfactual used in the studies on which the models built. In a number of cases, the data on the effectiveness of interventions used in the models was taken from studies that did not measure the do nothing counterfactual. The original analysis considered this by indicating the type of method employed in the studies. The updated analysis made the following adjustments to take account of the counterfactual:

1. Smoking cessation: For any study that did not measure the counterfactual, a 2% background cessation rate was assumed.
2. Statins: As the likely background rate at which those at risk of CHD would be identified is not known, any study that did not measure the counterfactual was removed from the analysis.[1]

### 3.1.2 Analysis of smoking cessation interventions

Adjustments were made to take account of relapse rates. The original analysis modelled the QALY impact of the quit rates reported by studies of the effect of intervention, assuming these quit rates would be maintained. No adjustment was made for relapse in smoking status beyond the period measured by these studies. Instead, sensitivity analysis was employed to assess the relapse rate that would cause the cost per QALY gained resulting from the intervention to become greater than a £20,000 threshold.

The updated analysis adjusts for likely relapse when estimating of the cost per QALY gained as a result of an intervention. Where the follow-up period of the effectiveness study is stated, table one summarises the adjustments made to the ICERs. The ICER multipliers summarised in table one are based on the work of West (2008) and of Hughes (2004). For instance, of five smokers who have not smoked for a month following an intervention, it is estimated that only one will remain a non-smoker for the rest of life.

**Table 1: Adjustments to ICERs to take into account likely relapse rates**

| Quit follow-up (months) | 1 | 3 | 6 | 12 | 24 | For rest of life |
|---|---|---|---|---|---|---|
| ICER multiplier | 5 | 2.5 | 2 | 1.54 | 1.25 | 1 |

In the event that the follow-up period of the effect study was not clear, no adjustment could be made. In this case, the ICER was been marked with an asterix in the results tables to indicate that no adjustment was possible. It is likely that in these cases the ICERs are underestimated.

A number of other study-specific updates where made, including:

- The analysis focused on the calculation of the cost per QALY gained associated with interventions. In one instance, the analysis was only able to estimate the cost per life year gains associated with an intervention (Chesterman et al, 2005). This intervention is not included in the updated analysis.

[1] The following studies were excluded from the analysis for this reason: Blumi et al (2000) and Gonzalez et al (2005)

- The data provided by a number of studies has been analysed to estimate the incremental cost per QALY gained for different treatment-counterfactual combinations compared to those estimated in the original analysis. Specifically:
    - The data provided by Zhu et al (1996) was originally used to estimate the incremental cost per QALY for 6 proactive phone calls compared with 1 proactive phone call, and 6 proactive phone calls compared with doing nothing. The updated analysis estimated the incremental cost per QALY for 6 proactive phone calls compared with 1 proactive phone call, and 1 proactive phone call compared with doing nothing.
    - The data provided by Milch et al (2004) was originally used to estimate the incremental cost per QALY for an anti-smoking advertising campaign compared with doing nothing and compared with another advertising campaign. The updated analysis estimated the incremental cost per QALY for each of the advertising campaigns compared with doing nothing.
    - The data provided by Hennrikus et al (2002) was originally used to estimate the incremental cost per QALY of both workplace smoking cessation interventions and workplace smoking cessation interventions combined with incentives compared with doing nothing. The updated analysis estimates the incremental cost per QALY gained of the smoking cessation interventions with incentives compared with the smoking cessation interventions without incentives.

### 3.1.3 Analysis of statins interventions

Three adjustments were made to the analysis of statins interventions. First, a number of interventions were removed from the analysis. Specifically, studies whose outcome measure was the blood pressure of participants were excluded as these outcomes were not considered an accurate enough predictor of the need for statins prescription.[2] Second, revised estimates of the cost per QALY gained as a result of taking statins were extracted from Ward et al (2005), The original analysis employed cost per QALY estimates from the Astra Zeneca analysis of statins (quoted in Ward (2005) but unrefereed). The updated analysis employed cost per QALY estimates from Ward et al's own analysis of statins undertaken to inform NICE guidance.

Third, the ICERs associated with statins use were adjusted for the recent reduction in the price of statins. The price of generic statins has continued to fall dramatically over the last few years. However, the estimated mean ICERs available within the literature, and employed in the original analysis, do not take these changes into account. These original ICERs were based on an estimate of £29 for 28 statin tablets, and this statin cost was the main contributor to the total cost of prescribing statins. However, the price of a pack of 28 generic simvastatin (20 mg dose) is now 54p, about 2% of the previous price (British National Formulary 2008 and British National Formulary 2002). Given this change in cost, an ICER of £13,000 would now be about £260, since most of the original cost would have been the cost of the drug . However, the cost of

[2] The following studies of interventions targeted at disadvantaged groups were excluded for this reason: Akhtar (2001), Bader et al (2006), Biswas et al (1997), Chatterjee (1997), Davis et al (1996), Hamilton et al (2003), Huckerby et al (2006), Kirkpatrick et al (2004), Krieger et al (1999), MacNee et al (1996), Manson-Siddle and Robinson (1999), Margolis et al (2003), Molokia et al (2000), Osbourne and Ascanio (2001), and William et al (2001).

prescribing and administering the statins would be a greater proportion of the total cost, and on the assumption that the cost per patient of doing this is £15 per year, the cost per QALY ranges from £847 to £973 for males and £820 to £925 for females. Therefore, in this supplementary analysis, the cost per QALY for statin treatment for secondary prevention is assumed to average £900 over all age ranges. For primary prevention with a 2% CHD risk per year, the cost per QALY, before the patent for the now-generic statins expired, was estimated to be between 1 and 4 times as high as for secondary prevention, depending on age and sex (Ward, 2005, Tables 63 and 65).

## 3.2 Findings

This section summarises the updated ICER estimates for interventions to get people to access smoking cessation and statins interventions. As per the original analysis, estimates of the effect of interventions for both disadvantaged groups and the general population were employed in the analysis. The next section summarises the results of the economic analysis for smoking cessation interventions. The following section summarises the results of the analysis for statins interventions.

### 3.2.1 Smoking cessation interventions

**Disadvantaged groups**

Table 2 summarises the ICERs for interventions to get disadvantaged groups to access smoking cessation interventions. The following ICERs are estimated:

- Three social-marketing interventions are identified, with a cost per QALY gained ranging from £420 to £6412. Only one of the interventions was evaluated using an RCT. The cost per QALY gained for this intervention was £6,412. Additionally, the studies did not all use the same perspective.
- One workplace intervention was identified, with a cost per QALY gained of £1,399.
- Two interventions for pregnant women were identified. Brief interventions for pregnant women had a cost per QALY gained of £1,593. Proactive telephone support had a cost per QALY gained of £5,992.
- One example of recruitment at a pediatric unit was identified, with a cost per QALY gained of £1,837.
- Two pharmacist-based interventions were identified, with costs per QALY gained of £1,030 and £5,272. Neither of these examples of pharmacist interventions was evaluated with good research designs, raising questions about the validity of the cost per QALY estimates. Only one of the studies was undertaken in the UK. This study had a cost per QALY gained of £1,030.
- One example free NRT was identified, with a cost per QALY gained of £1,627.
- Two examples of NHSSSS were identified, with a cost per QALY gained ranging from £2,535 to £2,837.

**General population**

Table 3 summarises the ICERs for interventions to get the general population to access smoking cessation (SC) interventions. The following ICERs are estimated:

- Eight examples of client-centred approaches were included in the analysis. However, for six of these examples the studies do not report follow-up periods, so the ICERs cannot be adjusted to reflect the likely relapse rates. For the remaining two interventions the cost per QALY gained was £65 (social marketing) and £437 (free mobile phones for use in SC counselling)

- Thirteen examples of proactive telephone counselling are identified. In four cases, the intervention is dominated by the counterfactual. As the data on these interventions is taken from a review paper, no detail is available on the nature of the counterfactual. Of the remaining examples, the cost per QALY gained ranges from £139 to £1,602.
- Eighteen examples of recruitment to quit-to-win interventions are identified. However, for three of these examples the studies do not report follow-up periods, so the ICERs cannot be adjusted to reflect the likely relapse rates. From the remaining fifteen examples, three are dominated by the counterfactual. As the data on these interventions is taken from a review paper, no detail is available on the nature of the counterfactual. The remaining twelve examples of recruitment to quit-to-win have costs per QALY gained ranging from £150 to £13,500. As the data on these interventions is taken from a review paper, there is insufficient detail on the interventions to explain this variation.
- Five examples of interventions to identify smokers through other means are identified. One of these examples does not report the follow-up period, so the ICER cannot be adjusted to reflect the likely relapse rate. For the remaining four interventions, one is dominated by the counterfactual – smoking assessment questionnaire (compared against usual care). The remaining three interventions have costs per QALY gained of £78 (smoking status and vital signs recording), £644 (expert systems intervention) and £4,178 (support in primary care).
- Four examples of dentist-based interventions were identified. In one example, the intervention was dominated by the counterfactual. In the remaining three examples, the cost per QALY gained ranged from £269 to £360. As the data on these interventions is taken from a review paper, there is insufficient detail on the interventions to explain this variation.
- One example of drop-in / rolling community based sessions was identified, with a cost per QALY gained of £1,260.
- Two examples of pharmacist-based interventions were identified, with costs per QALY gained of £438 and £655.
- Three examples of free NRT were identified. Two of these examples had cost per QALY gained estimates of £45 and £671. In the third example adverts for free NRT were dominated by adverts for a stop smoking guide.
- One example of workplace smoking cessation interventions with incentives was identified, with a cost per QALY gained of £2,089 when compared with workplace smoking cessation intervention without incentives.

**Table 2: ICERs for interventions to improve uptake of smoking cessation interventions among disadvantaged populations**

| Intervention type | Intervention | Study | Method (quit follow-up period) | Method quality | Location | Population | Cost pp | £/QALY gained |
|---|---|---|---|---|---|---|---|---|
| Client-centred approaches | Social marketing | Boyd et al 1998 | RCT | + | non-UK | African Americans | £0.31 | £6412 |
| | Social marketing | Schorling 1997 | Ecological study | + | non-UK | African Americans | £86 | £1,564 |
| | Social marketing | Stevens et al, 2002 | Observational study | - | UK | Turkish | £33 | £420 |
| Improving access | Workplace intervention | Barbeau et al 2006 | Cohort Study | + | non-UK | Apprentice iron workers. | £52 | £1,399 |
| Pregnancy | Brief intervention | Dornelas et al 2006 | RCT | ++ | non-UK | Low income pregnant women | £211 | £1,593 |
| | Proactive telephone support | Solomon 2000 | RCT | - | non-UK | Pregnant women | £140 | £5,992 |
| Incentive schemes | NRT prescription | Copeland et al, 2005 | Cohort Study (3m follow-up) | + | UK | Deprived area. | £230 | £1,627 |
| Identifying and reaching | Recruitment at pediatric unit | Curry et al 2003 | RCT | + | non-UK | Low income, BME | £155 | £1,837 |
| | NHSSSS (men) | Lowey et al, 2003 | Observational study (1m follow-up) | ++ | UK | Deprived area | £196 | £2,535 |
| | NHSSSS (women) | Lowey et al, 2004 | Observational study (1m follow-up) | ++ | UK | Deprived area | £196 | £2,837 |
| Improving access | Pharmacist-based | Bauld et al, 2006 | Observational study | ++ | UK | Deprived area | £151 | £1,030 |

| Intervention type | Intervention | Study | Method (quit follow-up period) | Method quality | Location | Population | Cost pp | £/QALY gained |
|---|---|---|---|---|---|---|---|---|
| | Pharmacist-based | Doescher et al 2002 | Pilot | + | non-UK | Low income | £310 | £5,272* |

**Table 3: ICERs for interventions to improve uptake of smoking cessation interventions among the general population**

| Intervention type | Intervention | Study | Method | Method quality | Location | Cost | Cost per QALY gained |
|---|---|---|---|---|---|---|---|
| Client-centred approaches | Recruiting smokers from community | Harding et al, 2004 | Descr. study | + | UK | £17 | £10* |
| | Social marketing to deliver client centred approaches to SC | Turner et al 2001 | CBA | - | non-UK | £1 | £65 |
| | Free mobile phones for use in SC counselling | Lavez et al 2004 | Obs. study | | non-UK | £68 | £35* |
| | | Vidrine et al 2006 | RCT | + | non-UK | £91 | £437 |
| | Interventions at cervical screening appointments | Hall et al, 2007 | RCT | + | UK | £18 | £86* |
| | | Hall et al, 2003a | RCT | - | UK | £3 | £19* |
| | | Hall et al, 2003b | RCT | - | UK | £0 | £0* |
| | Nurse run clinics | Campbell et al, 1998 | RCT | ++ | UK | £53 | £92* |
| Combined approaches | Proactive telephone counselling | Curry et al 1996 (in Lichtenstein et al 1996) | Review | | | £22 | £880 |
| | | DeBusk et al 1994 (in Lichtenstein et al 1996) | Review | | | £105 | £484 |
| | | Lando et al 1992 (in Lichtenstein et al 1996) | Review | | | £15 | Dominated |
| | | Lando et al 1994a (in Lichtenstein et al 1996) | Review | | | £45 | £1,602 |
| | | Lando et al 1994b (in Lichtenstein et al 1996) | Review | | | £23 | Dominated |
| | | Ockene et al 1991 (in Lichtenstein et al 1996) | Review | | | £22 | £652 |
| | | Ockene et al 1992 | Review | | | £22 | £195 |
| | | Prochaska et al 1993 (in Lichtenstein et al 1996) | Review | | | £30 | Dominated |

| Intervention type | Intervention | Study | Method | Method quality | Location | Cost | Cost per QALY gained |
|---|---|---|---|---|---|---|---|
| | | Rimer et al 1994a (in Lichtenstein et al 1996) | Review | | | £9 | Dominated |
| | | Rimer et al 1994b (in Lichtenstein et al 1996) | Review | | | £9 | £177 |
| | | Taylor et al 1990 (in Lichtenstein et al 1996) | Review | | | £52 | £139 |
| | | Zhu et al 1996a (in Lichtenstein et al 1996) | Review | | | £37 | £427 |
| | | Zhu et al 1996b (in Lichtenstein et al 1996) | Review | | | £45 | £144 |
| Identifying & reaching target populations | Recruitment to Quit and Win | Tillgren et al 2000 | Obs. study | + | non-UK | £2 | £153 |
| | | Altman et al 1987a (in Bains et al 1998) | Review | | | £53 | Dominated |
| | | Altman et al 1987b (in Bains et al 1998) | Review | | | £53 | £13,500 |
| | | Cummings et al 1990 (in Bains et al 1998) | Review | | | £53 | £150 |
| | | Elder et al 1991 (in Bains et al 1998) | Review | | | £53 | £209* |
| | | Elder et al 1987a (in Bains et al 1998) | Review | | | £53 | £232* |
| | | Elder et al 1987b (in Bains et al 1998) | Review | | | £53 | £77* |
| | | Fortmann and Killen 1995 (in Bains et al 1998) | Review | | | £53 | £231 |
| | | King et al 1987 (in Bains et al 1998) | Review | | | £53 | £269 |
| | | Korhonen et al 1992 (in Bains et al 1998) | Review | | | £53 | £1,076 |

| Intervention type | Intervention | Study | Method | Method quality | Location | Cost | Cost per QALY gained |
|---|---|---|---|---|---|---|---|
| | | Korhonen et al 1993 (in Bains et al 1998) | Review | | | £53 | Dominated |
| | | Lando et al (1991) (in Bains et al 1998) | Review | | | £53 | £1,120 |
| | | Lando et al 1990 (in Bains et al 1998) | Review | | | £53 | Dominated |
| | | Lefebvre et al 1990a (in Bains et al 1998) | Review | | | £53 | £342 |
| | | Lefebvre et al 1990b (in Bains et al 1998) | Review | | | £53 | £260 |
| | | Lefebvre et al 1990c (in Bains et al 1998) | Review | | | £53 | £391 |
| | | Leinweber et al. 1994 (in Bains et al 1998) | Review | | | £53 | £197 |
| | | Roberts et al 1993 (in Bains et al 1998) | Review | | | £53 | £517 |
| | ID smokers through other means | Bentz et al, 2006 | Obs. study | - | non-UK | £1 | £365* |
| | | Milch et al 2003a | Controlled trial | + | non-UK | £6 | Dominated |
| | | Milch et al 2003b | Controlled trial | + | non-UK | £17 | £78 |
| | | Prochaska et al 2001 | RCT | + | non-UK | £36 | £644 |
| | | Murray et al, 2007 | RCT | ++ | UK | £41 | £4,178 |
| Improving access | Dentist-based interventions | Andrews 1999 (in Carr and Ebbert et al 2007) | Review | | | £37 | £360 |
| | | Gansky 2002 (in Carr and Ebbert et al 2007) | Review | | | £42 | £269 |
| | | Gansky 2005 (in Carr and Ebbert et al 2007) | Review | | | £65 | Dominated |

| Intervention type | Intervention | Study | Method | Method quality | Location | Cost | Cost per QALY gained |
|---|---|---|---|---|---|---|---|
| | | Walsh 1999 (in Carr and Ebbert et al 2007) | Review | | | £75 | £302 |
| | Drop-in / rolling community based sessions | Owens and Springett, 2007 | Obs. study | - | UK | £22 | £91 |
| | Pharmacist-based interventions | Maguire et al 2001 (in Blenkinsopp et al 2001) | Review | | | £121 | £655 |
| | | Sinclair et al 1998 (in Blenkinsopp et al 2001) | Review | | | £23 | £438 |
| Incentive Schemes | Workplace smoking cessation (with vs without incentives) | Hennrikus et al 2002a | RCT | + | non-UK | £157 | £2.089 |
| | Free NRT | An et al 2006 | Cohort Study | + | non-UK | £108 | £671 |
| | | Bauer et al 2006a | Cohort Study | + | non-UK | £6 | £45 |
| | | Bauer et al 2006b | Cohort Study | + | non-UK | -£81 | Dominated |

* Studies for which the follow-up period was unavailable. The cost per QALY for this study makes no adjustment for future relapse rates.

### 3.2.2 Statins interventions

**Disadvantaged groups**

Table 4 summarises the ICERs for interventions to improve access to statins among disadvantaged groups. It demonstrates the ICERs for finding and treating those at risk of CHD using screening interventions. One intervention was identified whose purpose was secondary prevention (Feder et al, 1999). The cost per QALY gained associated with *finding* members of disadvantaged groups at risk of CHD using this intervention was £3,100. Once those at risk had been found, the cost per QALY gained associated with *treating* them with statins was £900. Overall, the cost per QALY gained associated with finding and treating with statins was £4,000.

A number of examples of screening interventions for primary prevention were identified (Byers et al,1999; Oexmann et al, 2001; O'Loughlin et al, 1996; Will et al, 2004). The cost per QALY gained associated with treating members of disadvantaged groups at risk of CHD once they had been identified by the screening intervention was £3,600. The cost per QALY gained associated with *finding* at risk members of disadvantaged groups varied between £660 and £122,000. The variation in cost per QALY gained is a function of the proportion of the population with a CHD risk. For instance, Will et al (2004) and Byers et al (1999) identify a number of screening interventions applied to populations with different levels of CHD risk. In the population with the highest level of CHD risk – 40% of the population were at risk of CHD – the cost per QALY gained of finding those at risk was £4,900. However, in the population with the least risk of CHD – only 1.6% of the population was at risk of CHD – the cost per QALY gained of finding those at risk was £122,000.

The *total* cost per QALY gained of screening to prescribe statins for primary prevention varied from £4,260 to £126,000. Further analysis of the screening for women intervention (Will et al, 2004; and Byers et al, 1999) suggest that screening for primary prevention has a cost per QALY gained lower than £20,000 as long as at least 14% of the population being screened is at risk of CHD, (at least 2% per year for the following 10 years, as stipulated in NICE Guidance TA094)..

**General population**

Table 5 summarises the ICERs for interventions to improve access to statins among the general population. Two examples of pharmacist interventions for the purpose of primary prevention were identified (Ali, 2003; Guthrie, 2001). The cost per QALY gained of finding those at risk of CHD was £4,205 - £4,634. Once identified, those at risk of CHD can be treated with statins at a cost per QALY gained of £3,600. The total cost per QALY gained of finding and treating those at risk of CHD ranges from £7,805 to £8,234.

Two examples of pharmacist interventions for the purposes of secondary prevention (counselling to improve compliance) were identified (Faulkner et al, 2000; and Lopez-Cabezas et al, 2000). The cost per QALY gained of finding those at risk of CHD was £748 - £1,079. Once identified, those at risk of CHD can be treated with statins at a cost per QALY gained of £900. The total cost per QALY gained of finding and treating those at risk of CHD ranges from £1,648 to £1,979.

**Table 4: ICERs for interventions to improve uptake of statins among disadvantaged groups**

| Intervention type | Intervention | Study | Method | Method quality | Location | Population | Cost pp | £/QALY (mean statin ICER) |
|---|---|---|---|---|---|---|---|---|
| Identifying and reaching | Culturally sensitive screening | Oexmann et al, 2001 | Case study | - | US | Medically under-served population | £52 | Find: £660<br>Treat: £3,600<br>Total: £4,260 |
| | Invitations for screening at GP | Feder et al, 1999 | RCT | + | UK | Deprived area. | £24 | Find: £3,100<br>Treat: £900<br>Total: £4,000 |
| | | O'Loughlin et al, 1996 | CBA | - | Canada | Low income multi ethnic area | £59 | Find: £1,092<br>Treat: £3,600<br>Total: £4,692 |
| | Screening for women | Byers et al, 1999 ; and Will et al, 2004. | Case study | + | US | Financially disadvantaged women | £321 | If 40% of population at risk of CHD:<br><br>Find: £4,900<br>Treat: £3,600<br>Total: £8,500<br><br>If 1.6% of population at risk of CHD:<br><br>Find: £122,000<br>Treat: £3,600<br>Total: £125,600 |

**Table 5: ICERs for interventions to improve uptake of statins among the general population**

| Intervention type | Intervention | Authors | Method (quality) | Location | Intervention cost | Cost per QALY |
|---|---|---|---|---|---|---|
| Supporting patients once identified | Pharmacist interventions | Ali, 2003 | BA (-) | Canada | £56.72 | Find: £4,634<br>Treat: £3,600<br>Total: £8,234 |
| | | Guthrie, 2001 | BA (+) | Spain | £6.78 | Find: £4,205<br>Treat: £3,600<br>Total: £7,805 |
| | | Faulkner et al, 2000 | RCT (-) | US | £95.88 | Find: £1,079<br>Treat: £900<br>Total: £1,979 |
| | | Lopez-Cabezas et al, 2006 | RCT (+) | Spain | £22.19 | Find: £748<br>Treat: £900<br>Total: £1,648 |

## 3.3 Discussion

This paper summarises a supplementary analysis of the cost-effectiveness of interventions to improve the reach and retention of smoking cessation and statins interventions among disadvantaged groups.

### 3.3.1 Smoking cessation

The analysis suggests that the following interventions targeted at disadvantaged groups have a cost per QALY gained lower than a £20,000 threshold, and are thus cost-effective:

- Social marketing interventions.
- Workplace interventions.
- Brief interventions and proactive telephone counselling for pregnant women.
- Recruitment in a paediatric unit.
- Pharmacist-based interventions.
- Free NRT.
- NHSSSS.

The analysis also provides estimates of the cost per QALY gained for some of these interventions when targeted at the general population, including:

- Social marketing when targeted at the general population had a cost per QALY gained of £65. This compared with a cost per QALY gained when targeted at disadvantaged groups of between £420 and £6,400.
- Pharmacist-based interventions. The cost per QALY gained for pharmacist interventions is £438-£655 when targeted at the general population and £1,030 when targeted at disadvantaged groups.
- Free NRT: The cost per QALY gained of free NRT is £45-£671 when targeted at the general population and £1,627 when targeted at disadvantaged groups.

However, these comparisons are confounded by heterogeneity in the intervention, methodology and location. For instance, the cost per participant of social marketing interventions identified in the analysis ranges from £1 to £86.

### 3.3.2 Statins

The analysis suggests that the following interventions targeted at disadvantaged groups have a cost per QALY gained lower than a £20,000 threshold and are thus cost-effective:

- Screening for secondary prevention
- Screening for primary prevention when at least 14% of the population is at risk of CHD.

Furthermore, the nature of the data available for statins interventions means that the analysis is able to distinguish the cost per QALY gained of finding or identifying those at risk of CHD and the cost per QALY gained of treating those at risk of CHD with statins. For secondary prevention, the cost per QALY gained of improving access to statins was £2,100, and the cost

per QALY gained of treating with statins was £900. For primary prevention the cost per QALY gained of improving access to statins ranged from £660 and £122,000, and the cost per QALY gained of treating with statins was £3,600. The variation in the cost per QALY gained of increasing access to statins is a function of variations in the proportion of the population being targeted that are at risk of CHD. For instance, if only 1.6% of the population were at risk of CHD, the cost per QALY gained of improving access to statins through screening would be of the order of £122,000. However, if 40% of the population were at risk of CHD, the cost per QALY gained of improving access to statins through screening would be of the order of £4,900.

A number of interventions for improving access to statins among the general population were analysed. However, these all involved pharmacy based interventions whereas those directed at disadvantaged populations involved screening. As a result the interventions for the general population were insufficiently comparable with those identified for disadvantaged groups to warrant comparison.

## 4.0 Bibliography

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