Methodological issues in developing a cost-effectiveness model for a domestic violence trial with intermediate outcomes.

Angela Devine[1], Anne Spencer[2], Sandra Eldridge[1], Gene Feder[3]

[1]Centre for Health Sciences, Barts & The London School of Medicine and Dentistry, Queen Mary, University of London; [2]Department of Economics, Queen Mary, University of London; [3] Academic Unit of Primary Health Care, School of Social and Community Medicine, University of Bristol

ABSTRACT

Aims
To develop a Markov model to capture the cost effectiveness of a programme to increase identification of domestic violence.

Methods
Our model is based on the results of a randomised control trial comparing rate of referrals to specialist domestic violence agencies in general practices that received a prompt integrated with the electronic medical record system, training and support with normal care. The states included were: no abuse, abuse unidentified, advocacy, disclosed but not seeking intervention and death. To predict point prevalence for each state, we ran the model using the control transition probabilities and cross-checked predictions with known prevalence data.

Data
Transition probabilities, QALYs and costs were taken from the trial results, literature and expert opinion. The trial did not follow up women beyond the intermediate outcome of referral to specialist agencies; extrapolating these to societal costs and benefits led to a number of methodological challenges. Identifying and applying appropriate data from domestic violence literature was difficult because of scarce research on the trajectory of abuse.

Results
Base case analysis indicated that the intervention would be cost saving; probabilistic sensitivity analysis showed that results were most sensitive to changes in projected benefit of advocacy and the intensity of post-referral care.

Conclusions
We compare the current model with one developed previously using pilot data. This illustrates the iterative nature of model building: a model based on pilot data informs data collection in the main trial and the current economic model is further refined in the light of new external data sources.

INTRODUCTION

Domestic violence is threatening behaviour, violence or abuse (psychological, physical, sexual, financial or emotional) between adults who are in the same family or who are or have been intimate partners. It is a severe breach of human rights with profound health consequences, particularly for women who, compared to men, experience more sexual and more severe physical violence from their partners.[1-3] The population prevalence of physical and sexual violence varies internationally from 15 to 71%.[4] The prevalence of domestic violence among women seeking healthcare is higher than the general population.[5] In populations of women attending general practice, the prevalence of physical or sexual abuse in the past year from a partner or ex-partner ranges from 6 to 23%, and lifetime prevalence from 21 to 55%.[6] This large variation reflects different measures of abuse, as well as actual differences in national, regional and local prevalence.

Domestic violence damages health. Survivors suffer many chronic health problems including: gynaecological problems,[7] chronic pain[8] and neurological symptoms,[7] gastrointestinal disorders,[9] and self-reported cardiovascular conditions.[10] The physical health consequences of abuse are dwarfed by its impact on mental health, including post traumatic stress disorder, depression, anxiety and substance abuse,[11 12] which can persist long after the violence has ceased. In recent years, the overall UK cost estimates for domestic violence, including medical and social services, lost economic output and emotional costs, have decreased due to a fall in the rate in the rate of domestic violence.[13 14] Despite this fall in overall costs, the use of public services increased to £3.9 billion in 2008 as the result of an increase in the proportion of victims seeking help alongside inflation.[14]

Healthcare may be a survivor's first or only point of contact with professionals, and abused women are more likely to be in touch with health services than any other agency.[15] The magnitude of the health consequences of domestic violence contrasts starkly with its virtual invisibility within primary health care; in one general practice based questionnaire study only 15% of women with a history of domestic violence had any reference to violence in their medical record.[16] If women disclose domestic violence to a clinician, whether in a primary care or specialist setting, there is evidence of an inappropriate, poor quality response.[17] Doctors and nurses are largely unaware of appropriate interventions and have seldom received effective or, in the United Kingdom, any training.[16] Yet abused women identify doctors as the professionals from whom they would most like to seek support.[17]

There is evidence reported in a systematic review of 15 controlled studies that health care system level training and organisational change can increase the disclosure of domestic violence to healthcare professionals,[18] although less certainty of an effect on referral to specialist services or other measures beyond identification, including improved outcomes for women experiencing abuse. A cluster randomised controlled trial of a training and screening intervention showed no effect on referral.[19] Overall, there remains uncertainty about effective domestic violence training models for primary care clinicians, particularly outside North America, and an absence of evidence about the cost effectiveness of interventions to improve outcomes for women experiencing abuse.[20]

The IRIS trial was a further development of the Prevention of Domestic Violence (PreDoVe) pilot study, which used prompts in the electronic medical record as a screening tool for domestic violence.[21] The refinements of the intervention for IRIS included two (rather than one) initial educational sessions at the practices, regular contact and reinforcement with

intervention practices, and a more explicit referral pathway for domestic violence advocacy. Our aim was to use Markov modeling to examine the potential costs, outcomes and cost effectiveness of implementing the IRIS intervention. The purpose of this paper is to examine both this model and how it changed as a result of new information and trial modifications, which were influenced by the PreDoVe model.

METHODS

In order to calculate the cost effectiveness of the IRIS programme, we fitted a model with and without the programme and used the differences between the two simulations to calculate the incremental costs and outcomes associated with IRIS. We attempted to describe a set of states that a woman experiencing domestic violence (or not) can be in at any one time. We assumed that at any point in time all women must be in only one of these states. The model then simulates how a hypothetical cohort of women moves between the states.

Model Structure

Our Markov model (Figure 1) was largely based on the work done by Norman *et al*. for the PreDoVe intervention, a pilot version of the IRIS education and support intervention.[5 22] The economic model for PreDoVe informed the trial design for IRIS, and the most significant change was the outcomes collected. The PreDoVe trial found that health professionals do not always use the prompts when they asked about IPV. Consequently, the PreDoVe model assumed that referrals needed to be increased by 25% to adjust for this. The IRIS study implemented electronic medical record searches for disclosure of domestic violence and referral to an advocate so that this figure did not require any adjustments. IRIS also collected data on assessment for abuse in the control practices, something the PreDoVe trial did not. With the intervention refinements from PreDoVe, IRIS collected more robust results than was previously available.

The possible states of individuals in the model were:

- No abuse
- Abuse unidentified
- Advocacy
- Identified Existing Victim (IEV)
- Death

The IRIS model also differs from PreDoVe in that the state medium term improvement was removed. The state had been created to capture the intermediate costs and benefits of a woman whose condition has improved but has not yet reached the point where she is completely free of domestic violence. While this state was intended to reflect the journey to no abuse, little data exists on what this state involves.

This was a population model for women aged 16 and older from England and Wales. The chances of one individual woman moving were determined by transitional probabilities, defined either by data directly recorded in the IRIS trial or from published literature. As six months is the average amount of time a woman stays in contact with advocacy services, each cycle was six months in length.[5] In order to aid comparison with the PreDoVe model, a ten year time horizon was used.[23]

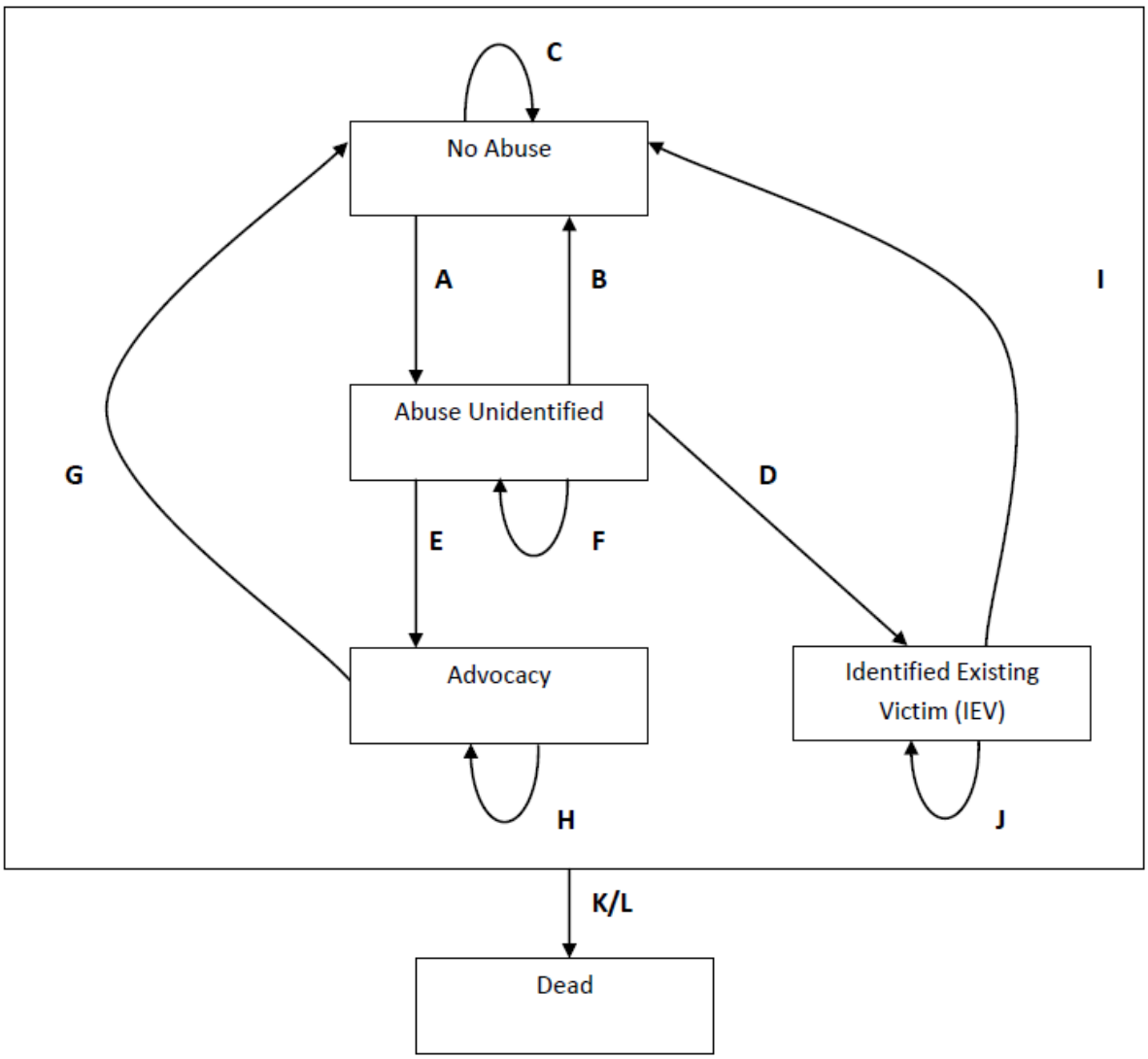

Figure 1 Markov model diagram

Transition probabilities

For one year following the educational sessions, data were collected on the rate of referral to advocacy. While the primary outcome in the trial was the number of referrals recorded in the general practice records, the model counted a referral as the number of women who either were referred to the advocate or who contacted the advocate directly. This is to adjust for the instances where the GP recorded a referral but did not contact the advocate as per the protocol. In this way, we capture the results of the intervention in terms of women who were actually contacted by or attempted contact by the advocates. The number of referrals was used as numerator over a denominator of the number of women aged 16 or over within a practice. Advocates responded quickly to their GP referrals, so it was assumed that women who were referred moved straight into the advocacy state.

The number of women being identified (abuse unidentified to IEV) and referred to an advocate (abuse unidentified to advocacy) was significantly different for women in the intervention and control practices (Table 1). By incorporating these differences in six-monthly transition probabilities, the projected differences in costs and outcomes could be compared

by our model. While the PreDoVe model had an extra instantaneous step based on the number assessed by the GP, these data were not reliable and were not recorded in the IRIS trial. This step was removed from the IRIS model, allowing women to move directly from abuse unidentified to either IEV or advocacy and better reflecting the movement of women between states.

All cause mortality for women in the United Kingdom aged 16 and older in 2008 was 0.011646(264,031/22,671,300).[24] For women experiencing IPV, mortality resulting from IPV (M_{IPV}) for was 0.00019 (102/529,000).[13] The mortality rate from IPV for all women was calculated (102/22,671,300) and subtracted from the death rate for all women to get 0.011642, the mortality rate used in the model for women not experiencing IPV (M_{NA}). The mortality rate for women experiencing abuse in our model (M_A) was estimated to be 0.011834 ($M_{NA} + M_{IPV}$).

For the other transition probabilities between states, we took data from other relevant studies and assumptions based on the best available data (Table 1). The transition probabilities for recovery from abuse were drawn from a recent systematic review[25] of the rate of recovery from physical abuse for women in intensive advocacy, which was largely based on a trial by Sullivan and Davidson.[26] The transition probability for advocacy to no abuse came from the intervention outcomes and the probability for IEV to no abuse came from the control arm results.

The model was run until steady states for the population in each group were achieved. In this way, the prevalence of each state could be compared to the known population prevalence. If these figures were very dissimilar, the transition rates which had the most uncertainty around them and which were based on assumptions were adjusted accordingly. These rates were the rate from no abuse to abuse unidentified and the rate from abuse unidentified to no abuse as they were assumptions drawn from the PreDoVe model. Steady states determined the start distribution of women in the model.

Table 1 Transition probabilities (six-monthly)

	Control	**Intervention**	**Source**
No abuse to abuse unidentified (A)	0.0075		Assumption
Abuse unidentified to no abuse (B)	0.025		Assumption
No abuse to no abuse (C)	0.9867		Complementary to A + K
Abuse unidentified to IEV (D)	0.0094	0.0207	IRIS
Abuse unidentified to advocacy (E)	0.0016	0.0101	IRIS
Abuse unidentified to abuse unidentified (F)	0.9581	0.9383	Complementary to D + E + L
Advocacy to no abuse (G)	0.4331		Ramsay[25]
Advocacy to advocacy (H)	0.561		Complementary to G + L
IEV to no abuse (I)	0.3317		Ramsay[25]
IEV to IEV (J)	0.6623		Complementary to D + L
Death rate if not being abused (K)	0.0058		All cause mortality[24]
Death rate if being abused (L)	0.0059		All cause mortality[24] + Walby[13]

Intervention costs

Intervention costs were taken directly from the clinical trial, which took place in Bristol and Hackney, east London (Table 2). The total six-monthly intervention costs were divided by the number of registered women in the intervention practices.

Advocate educator

The salary for an advocate educator included the time needed to conduct all training sessions, further communication and support to the practice, and initial management of women referred by the 12 practices and excluded time allocated to research support. Salaries were inclusive of management costs, pension contributions, and National Insurance contributions. We did not adjust costs between practices, although these varied in size and referral activity, because a) the salary costs were fixed at the start and could not be varied in practice b) the practices that referred disproportionately fewer women, with a smaller impact on advocate caseload required greater training and support input to encourage increased engagement with the programme, increasing the workload of the advocate.

Training time and costs

Initial training consisted of two two-hour sessions delivered in the intervention practices by an advocate educator. A clinical psychologist attended one session and an academic General Practitioner (GP) attended the other. We costed the allocated time rather than the actual training time, as the latter varied, but the prospective time commitment was fixed. Any supplementary training for practices that were not making referrals would be conducted by the advocate educator only and included in the advocate's salary. It was assumed that training would need to be repeated annually with the same staff in attendance. The costs of providing lunch during the training, six posters to each practice and 200 leaflets per practitioner annually were also included. As it is envisaged that the staff time spent at training would be a personal cost and not one included when commissioning this intervention, these costs were not included in the baseline analysis.

Health professional time and costs

It was assumed that time spent by GPs in identifying and referring additional women as a result of the intervention would be integrated into normal consultation times and not require an increase in GP hours.

Table 2 Six-monthly advocacy intervention costs (2008 prices)

	Cost	Source
Advocate salaries and travel costs: 0.9 full time equivalent	£24,518	IRIS
Clincal staff time and travel to lead training sessions	£3,766	IRIS
Administration costs	£1,401	IRIS
Practice reimbursement	£9,413	IRIS
Total six-monthly costs	**£39,097**	
Per woman registered at 24 practices	£0.55	IRIS

Costs of onward referrals from advocates

IRIS found that 56% of women received an onward internal or external referral and an 80% uptake of referrals. The amount of time per onward referral varies greatly. We assumed an average of 57 hours per onward referral to other advocacy services. This figure was calculated based on Sullivan and Davidson's advocacy time less the time spent by advocate educators in the trial.[26] In this way, we were able to link the costs associated with advocacy with the transition rates out of the IEV and advocacy states.[25 26] The cost per hour of an onward referral was drawn from the advocate educator salaries.

Costs and outcomes of abuse

For costs associated with events beyond the measured trial outcomes (identification and referral to domestic violence advocacy), estimations were drawn from Walby's work on the societal and personal costs incurred by women living with and without domestic violence (Table 3).[13] While these figures were updated in 2009, the report noted that domestic violence has decreased while services for victims have increased, resulting in similar overall cost figures to those in the original report.[14] Health care costs for major medical events and additional primary care visits were included. To ascribe the cost benefits for women who have received help from an advocate, the advocacy state costs were reduced by 25%. Identification alone can confer some benefit, so the costs for the IEV state were reduced by 10%.

Quality of Life (QoL) for the states involving abuse (abuse unidentified, IEV and advocacy) was taken from survey data by Wittenberg *et al*. and can be found in Table 3.[27] In this trial, women were re-sampled in a cross-sectional IPV survey, collecting data on the severity of violence and QoL (SF-12). They then converted the SF-12 data to QoL utilities on a scale of 0 (equivalent to death) and 1 (equivalent to optimal health) for those with less severe and more severe violence using weights designed for a UK population.[28] QoL for women in no abuse was taken from EQ-5D data from a trial of UK women with low-grade abnormalities found during screening for cervical pre-cancer.[29]

Table 3 Average six-monthly costs and Quality of Life for women by states (2008 prices)

	No abuse	**Abuse unidentified**	**IEV**	**Advocate**	**Source**
Criminal justice	£0	£983	£885	£737	Walby[13]
Civil justice	£36	£355	£320	£266	Walby[13]
Employment loss of output	£0	£2,439	£2,195	£1,829	Walby[13]
Medical services	£0	£184	£166	£138	Walby[13]
Mental health	£63	£250	£188	£225	Walby[13]
Social services and child care	£0	£487	£438	£365	Walby[13]
Temporary housing	£3	£23	£21	£18	Walby[13]
Total six-monthly costs	**£102**	**£4,721**	**£4,249**	**£3,541**	
Onward referral*	-	-	-	£823	IRIS, Sullivan[26]
Utilities	0.88	0.63	0.63	0.65	Wittenberg[27], Whynes[29]

*A one-time cost for women entering the advocacy state from abuse unidentified

Cost-effectiveness analysis

The costs and outcomes along with the intervention costs described above were applied to the model's transition rates as appropriate. All costs and benefits were reported in 2008 British Pounds; costs taken from other years were adjusted as appropriate.[30] In accordance with national guidelines, the future costs and outcomes in the model were discounted at 3.5%.[31]

We used Microsoft Excel and Oracle Crystal Ball for our analyses. We determined the mean incremental costs and incremental QALYs of implementing the IRIS screening programme as compared to usual care delivered in the control practices and reported incremental cost effectiveness ratios calculated as appropriate. Non-parametric bootstrapping with 1,000 iterations was used to calculate 95% confidence intervals (CIs) for the differential costs and differential QALYs. The initial analysis was from a societal perspective with a secondary analysis focusing on costs and cost effectiveness from an NHS provider perspective.

Sensitivity Analysis

To assess the robustness of our model, we performed a probabilistic sensitivity analysis (PSA) on the model using distributions for each variable. Transition rates and costs had lognormal distributions with standard deviations of 25% the mean value for values from the trial and 75% for values from the literature and assumptions. Rates associated with service use input were normal distributions with SDs of 50% of the mean value. Population figures were also normal distributions with SDs of 25% of the mean value. Beta distributions were used for the QoL data. The PSA identified the parameters which had the greatest impact on model outcomes.

RESULTS

The steady states demonstrated that the rates from no abuse to abuse unidentified and the rate from abuse unidentified to no abuse needed to be adjusted. The rate of spontaneous recovery from abuse (abuse unidentified to no abuse) was increased from 0.005 (PreDoVe assumption) to 0.025. To compensate for this increase, the rate from no abuse to abuse unidentified was raised from 0.0027 to 0.005. With these adjustments, the model reflected the population prevalence of abuse at 17.7%.[16] Starting populations for each state were determined to be 82.3% in no abuse, 17.2% in abuse unidentified, 0.1% in advocacy and 0.5% in IEV.

Cost effectiveness

The intervention arm demonstrated a cost savings per woman registered of £1,192 (95% CI -£256 to -£2,915) over 10 years. The incremental QALY outcome was estimated to be 0.0636 (95% CI -0.0402 to 0.1857) per woman. Since the intervention programme demonstrated lower costs and higher effectiveness, it dominated current practice.

When societal costs were removed from the model to focus on the NHS costs for medical attention and mental health only, the result was a cost savings of £74 per woman over 10 years. At the practice level, this would be a mean savings of £3,084 per year.

Sensitivity analysis
The PSA demonstrated an 88% chance that the intervention would be either cost saving or cost neutral. The model was most sensitive to changes in the cost of lost employment output due to abuse, the QoL for women in the abuse unidentified state, the cost of criminal justice due to abuse and the transition rate from IEV to no abuse.

DISCUSSION
The comparison of the current model (IRIS) with the one developed previously using pilot data (PreDoVe) helps to illustrate the iterative nature of model building. To our knowledge few papers have reported this iterative process, probably because until recently very few studies developed models during the pilot data collection or the pilot models were not published. Our study highlights the usefulness of developing a pilot model and also shows how the economic model can be further refined in the light of new external data sources.

The PreDoVe model highlighted a number of discrepancies in our pilot data collection and subsequently informed the data collection in the main trial. For example, the PreDoVe model drew attention to the possibility that women who were given a referral may not actually see an advocate immediately or may see the advocate for some time followed by a time of not seeking further assistance. The PreDoVe model represented the advocacy state as women actively seeing an advocate and therefore included transitions between advocacy and IEV. The main trial corrected for this omission through the collection of data on the number of women who accepted the referral and saw the advocate and the number of women who received a referral but did not see the advocate. Accordingly, the IRIS model the advocacy state only included those women who were seen by the advocate and the IEV state only included those women who were identified by a healthcare professional but never saw an advocate.

The IRIS model aimed to simplify the PreDoVe model to provide a clearer picture of women's journeys into and out of abuse. We dropped the medium term improvement state as we found no data to inform this state. We also used a flat reduction of all DV-related costs of 10% for IEV and 25% for advocacy, rather than using PreDoVe's list of assumptions to change specific costs. For instance, PreDoVe increased or decreased specific costs, such as criminal justice, based on assumptions about whether women would be more or less likely to access if in abuse unidentified, advocacy, IEV or medium term improvement. It is possible that the overall results are lower in the IRIS model than the PreDoVe model due to the differences in the way that the societal costs were applied to the states. As in PreDoVe, our analysis excluded the cost of staff attendance at IRIS training sessions as we believed this would be absorbed by staff and practices and potentially compensated for by money paid to practices.

The IRIS evaluation captured the movements of all women registered at the practice aged 16 and older, with a death rate to match, as this reflected better the age cohort of women exposed to the intervention in the GP practice. The main discrepancy was the domestic violence prevalence of 17%, which came from women attending their GPs rather than all women registered at the practice. As not all women see their GP and women experiencing abuse are likely to see their GP more often than the general population, this figure is

potentially higher than it should be for the population of women in our model. While this prevalence was also used in PreDoVe, the pilot model only used a death rate for women aged 16-45 as these women were more likely to be the victims of abuse. This death rate failed to reflect the fact that women over 45 were also exposed to the intervention and that many of the societal costs were calculated as a proportion of the total population experiencing abuse.

The IRIS model aimed to use new evidence on the costs and outcomes of a domestic violence screening programme. The Cochrane review informed our rates from both advocacy and IEV to no abuse,[25] whereas the PreDoVe model based these rates on assumptions.[22] New evidence on the trajectory of women experiencing abuse to inform the medium term improvement state used in PreDoVe, however, was not forthcoming. It remained the case that few advocacy interventions have collected or published QoL data that can be used by economic models to plot the trajectory of women in and out of abuse.[27]

The IRIS model also adjusted the results of the primary trial to reflect better the trajectory of women into and out of abuse. For instance, the model used a more conservative estimates of effect compared to the trial primary outcomes. In the model, women that were referred to an advocate but never saw one were not included, but they were included in the primary outcome of the trial. This meant that 15 fewer women were referred in the intervention arm. The model also included 28 women in the control arm of the trial who were not referred but saw an advocate. Both of these differences from the primary trial analysis make our estimates of cost effectiveness more conservative and allow our model to better reflect the trajectory of women. The women who were referred in the primary consultation but did not accept the referral were included in our model as part of the transition rate from unidentified abuse to IEV.

Overall, these combined changes reduced the prevalence of domestic violence in our model from PreDoVe's prevalence of 25.7% to 17.7%. Incremental QALY was increased from 0.0313 in PreDoVe to 0.0636 in IRIS. This is likely to be due to the removal of medium term improvement, which meant we replaced the QoL value for advocacy (0.63) with that of medium term improvement (0.65). In addition, it is affected by the increase in the rate from advocacy to no abuse (0.43)[25] compared with that of medium term improvement to no abuse (0.2 assumption)[22].

The IRIS model represents a more robust combination of the data sources available than its predecessor and therefore is a better estimate of the effect of the intervention. We were able to use the Cochrane review to inform some of the key transition rates, and we had better data from the main study than the pilot. Despite this we faced a number of challenges in developing the model, some of which will only be addressed by further research. For estimating the longer term affects, we found it difficult to find QoL and transition rates from the literature that affected the same kinds of women addressed here and compared a similar intervention. Estimates were either for a different group of women (e.g. living in sheltered housing), a more or less intensive programme (e.g. seeing advocacy services for 60 hours instead of the three hours spent by our advocates), or from population data on domestic violence costs from such sources as Walby. We also found the most challenging parameters to quantify in the IRIS model were the rates between no abuse and abuse unidentified, which remained as assumptions in the IRIS model. We conclude that more research is

needed on the trajectory of women into and out of abuse in terms of the societal costs and consequences of abuse.

REFERENCES

1. Tjaden P, Thoennes N. Extent, Nature, and Consequences of Intimate Partner Violence: Findings from the National Violence Against Women Survey. Washington DC: National Institute of Justice and the Centers for Disease Control and Prevention, 2000:1-62.
2. Finney A. Domestic violence, sexual assault and stalking: Findings from the 2004/05 British Crime Survey. 2006:1-39.
3. Morse BJ. Beyond the Conflict Tactics Scale: assessing gender differences in partner violence. *Violence Vict* 1995;10(4):251-72.
4. Garcia-Moreno C, Jansen HA, Ellsberg M, Heise L, Watts CH. Prevalence of intimate partner violence: findings from the WHO multi-country study on women's health and domestic violence. *Lancet* 2006;368(9543):1260-9.
5. Feder G, Ramsay J, Dunne D, Rose M, Arsene C, Norman R, et al. How far does screening women for domestic (partner) violence in different health-care settings meet criteria for a screening programme? Systematic reviews of nine UK National Screening Committee criteria. *Health Technol Assess* 2009;13(16):iii-iv, xi-xiii, 1-113, 37-347.
6. Hegarty K. What is intimate partner abuse and how common is it? In: Roberts G, Hegarty K, Feder G, editors. *Intimate Partner Abuse and Health Professionals*: Elsevier, 2006:19-40.
7. Campbell JC. Health consequences of intimate partner violence. *Lancet* 2002;359(9314):1331-6.
8. Bonomi AE, Anderson ML, Reid RJ, Rivara FP, Carrell D, Thompson RS. Medical and psychosocial diagnoses in women with a history of intimate partner violence. *Arch Intern Med* 2009;169(18):1692-7.
9. Coker AL, Davis KE, Arias I, Desai S, Sanderson M, Brandt HM, et al. Physical and mental health effects of intimate partner violence for men and women. *Am J Prev Med* 2002;23(4):260-8.
10. Tollestrup K, Sklar D, Frost FJ, Olson L, Weybright J, Sandvig J, et al. Health indicators and intimate partner violence among women who are members of a managed care organization. *Prev Med* 1999;29(5):431-40.
11. Golding JM. Intimate Partner Violence as a Risk Factor for Mental Disorders: A Meta-Analysis. *Journal of Family Violence* 1999;14(2):99-132.
12. Coid J, Petruckevitch A, Chung WS, Richardson J, Moorey S, Feder G. Abusive experiences and psychiatric morbidity in women primary care attenders. *Br J Psychiatry* 2003;183:332-9; discussion 40-1.
13. Walby S. The Cost of Domestic Violence. In: Industry DoTa, editor, 2004.
14. Walby S. The Cost of Domestic Violence: Up-date 2009: United Nations Educational, Scientific and Cultural Organization, 2009.
15. Feder G. Responding to intimate partner violence: what role for general practice? *Br J Gen Pract* 2006;56(525):243-4.
16. Richardson J, Coid J, Petruckevitch A, Chung WS, Moorey S, Feder G. Identifying domestic violence: cross sectional study in primary care. *BMJ* 2002;324(7332):274.
17. Feder GS, Hutson M, Ramsay J, Taket AR. Women exposed to intimate partner violence: expectations and experiences when they encounter health care professionals: a meta-analysis of qualitative studies. *Arch Intern Med* 2006;166(1):22-37.
18. Ramsay J, Feder G, Rivas C. Interventions to reduce violence and promote the physical and psychosocial well-being of women who experience partner abuse: a systematic review. London, 2006.

19. MacMillan HL, Wathen CN, Jamieson E, Boyle MH, Shannon HS, Ford-Gilboe M, et al. Screening for intimate partner violence in health care settings: a randomized trial. *JAMA* 2009;302(5):493-501.
20. Gold L, Norman R, Devine A, Feder G, Taft AJ, Hegarty KL. Cost Effectiveness of Health Care Interventions to Address Intimate Partner Violence: What Do We Know and What Else Should We Look for? *Violence Against Women*.
21. Gregory A, Ramsay J, Agnew-Davies R, Baird K, Devine A, Dunne D, et al. Primary care identification and referral to improve safety of women experiencing domestic violence (IRIS): protocol for a pragmatic cluster randomised controlled trial. *BMC Public Health*;10:54.
22. Norman R, Spencer A, Eldridge S, Feder G. Cost-effectiveness of a programme to detect and provide better care for female victims of intimate partner violence. *J Health Serv Res Policy*;15(3):143-9.
23. Norman R. Cost-effectiveness of a system level intervention to improve the primary health care response to intimate partner violence (in press). *Journal of Health Services Research & Policy*.
24. *Mortality statistics. review of the Registrar General on deaths in England and Wales. Deaths registered in*: [Basingstoke] : Palgrave Macmillan, 2008-.
25. Ramsay J, Carter Y, Davidson L, Dunne D, Eldridge S, Feder G, et al. Advocacy interventions to reduce or eliminate violence and promote the physical and psychosocial well-being of women who experience intimate partner abuse. *Cochrane Database Syst Rev* 2009(3):CD005043.
26. Sullivan CM, Davidson WS, 2nd. The provision of advocacy services to women leaving abusive partners: an examination of short-term effects. *Am J Community Psychol* 1991;19(6):953-60.
27. Wittenberg E, Lichter EL, Ganz ML, McCloskey LA. Community preferences for health states associated with intimate partner violence. *Med Care* 2006;44(8):738-44.
28. Brazier JE, Roberts J. The estimation of a preference-based measure of health from the SF-12. *Med Care* 2004;42(9):851-9.
29. Whynes DK. Correspondence between EQ-5D health state classifications and EQ VAS scores. *Health Qual Life Outcomes* 2008;6:94.
30. Curtis L. Unit Costs of Health and Social Care 2008. Canterbury: Personal Social Services Research Unit, 2008.
31. *The Green Book : appraisal and evaluation in central government : Treasury guidance*. [New ed.] ed. London: TSO, 2003.