Educational strategies to promote evidence-based community pharmacy practice: a cluster randomized controlled trial (RCT)

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**Background.** Community pharmacists have increasing involvement in the self-management of minor illness as a result of the availability of a wider range of over-the-counter (OTC) medicines. We undertook a randomized controlled trial (RCT) to assess the effectiveness and efficiency of educational strategies to implement evidence-based guidelines for the sale of OTC anti-fungals in the community pharmacy setting.

**Objective.** The aim of the study was to compare the effectiveness and efficiency of two guideline dissemination strategies in community pharmacy settings.

**Methods.** A $2 \times 2$ factorial, cluster RCT was conducted with 60 community pharmacies in the Grampian region of Scotland. The interventions included dissemination of an evidence-based guideline for OTC management of vulvovaginal candidiasis (thrush) by postal dissemination (control), educational outreach visit or attendance at a continuing professional education session. Pre- and post-intervention simulated patient visits were made to participating pharmacies. The simulated patients completed assessment forms following each visit. The primary outcome was the appropriateness (based upon the guidelines) of sale or no sale of OTC anti-fungals.

**Results.** There were no significant differences in the proportion of appropriate outcomes following educational outreach [odds ratio (OR) = 1.1; 95\% confidence interval (CI) 0.52 to 2.45] or continuing professional education (OR = 0.88; 95\% CI 0.41 to 1.91).

**Conclusions.** Neither strategy was effective in improving the appropriateness of OTC management of vulvovaginal candidiasis by community pharmacy staff. Further research is needed to identify barriers to guideline implementation and evidence-based practice in this setting.

**Keywords.** Community pharmacy services, non-prescription drugs, pharmacy continuing education, randomized controlled trial.

**Introduction**

Community pharmacists have increasing involvement in the self-management of minor illness as a result of the availability of a wider range of over-the-counter (OTC) medicines.\textsuperscript{1} The role of community pharmacy in providing advice is endorsed further by recent White Papers.\textsuperscript{2,3} However, there are concerns about whether pharmacists and pharmacy staff give patients appropriate advice about OTC medicines.\textsuperscript{4–8} Pharmacists have expressed a need for educational initiatives in this area.\textsuperscript{8} The Royal Pharmaceutical Society of Great Britain (RPSGB) introduced mandatory supervision protocols for OTC medicine sales in response, and a requirement that all counter staff should hold a minimum qualification.\textsuperscript{9,10} Pharmacists are also required to undertake 30 hours of continuing professional education (CPE) annually.

Evidence-based practice is accepted as the gold standard for clinical care, and in the medical setting there has been extensive study of the best ways of implementing clinical guidelines.\textsuperscript{11,12} Educational outreach (EO) visits frequently are effective in achieving behavioural change in medical settings,\textsuperscript{13} especially for prescribing
It is not known whether this strategy is as effective in different professional settings such as community pharmacy. Interactive education workshops are a widely used and frequently effective method of CPE, and there are well established structures throughout the UK to support these activities. Centrally organized interactive educational meetings are the mainstay of CPE for pharmacists, despite little evidence of their effectiveness. Between 2000 and 2001, SCPPE (Scottish Centre for Post-qualification Pharmacy Education) events were attended by 3500 participants, totalling 11 000 hours CPE.

We undertook a randomized controlled trial (RCT) to assess the effectiveness and efficiency of educational strategies to implement evidence-based guidelines in the community pharmacy setting.

Methods

Randomized controlled trial (RCT)

A 2 × 2 factorial cluster RCT evaluated the effectiveness and efficiency of two guideline dissemination strategies—EO visits and CPE. All eligible pharmacies in Grampian (n = 121) were invited to participate. Following stratification for type (e.g. single-handed versus multiple) and location (e.g. rural/urban), the pharmacies were randomized by a statistician independent of the research team, using random numbers, to one of the four groups: control (guideline materials only); EO (guidelines and one EO visit); CPE (guidelines and attendance at one CPE session); and EO and CPE (guidelines plus both interventions, EO and CPE).

Interventions

Evidence-based guidelines for OTC treatment of vulvovaginal candidiasis were derived from systematic literature reviews and mailed to all pharmacies in the Grampian region of Scotland. Key recommendations are presented in Box 1.

Educational outreach (EO)

Two pharmacists were employed to provide EO visits to disseminate the guidelines. They were trained in interpersonal skills, the IDEALS approach to educational outreach used by many pharmaceutical companies (Table 1) and the guideline recommendations.

Pharmacies allocated to EO were assigned randomly across the two outreach visitors. The purpose of the visit was to reinforce the guideline recommendations and discuss their application in practice. Each pharmacy received one outreach visit and a follow-up telephone call 4–6 weeks later to determine whether the guidelines were being used and whether there had been any specific problems or queries with their use. Following each visit, the visitor completed an assessment form with details of their visit (e.g. time, duration, number of staff present).

Box 1 Main guideline recommendations for the over-the-counter treatment of vaginal candidiasis

Avoid external treatment only
No treatment required for male sexual partner
Avoid treatment during pregnancy[a]
Oral anti-fungal drugs are marginally more effective than intra-vaginal administration,[b] but contra-indications and patient preference should be considered.

The guidelines also included a summary of the symptoms that are most suggestive of vaginal candidiasis and when the patient should be referred to her GP.

[a] Anti-fungals for sale as over-the-counter products are not licensed for the treatment of vaginal candidiasis during pregnancy.
[b] On completion of the systematic review, no substantial or significant difference was shown with the relative effectiveness of oral and intra-vaginal anti-fungals.

Table 1 The IDEALS approach to educational outreach

| Introduction | A personal introduction from the outreach visitor. |
| Discover    | What are the pharmacy staff information requirements? |
| Explain     | The problem, e.g. overuse/inappropriate use of anti-fungals. |
| Ask         | The pharmacy staff if they agree with the recommendations: address doubts which they have on any of the topics discussed. |
| Leave       | Promotional material, i.e. references to support the guideline recommendations, additional guideline materials. |
| Seek        | Commitment from pharmacy staff to read and adopt the guidelines. |

Continuing professional education (CPE)
Currently, SCPPE provides CPE events for NHS pharmacists registered in Scotland. Pharmacists and pharmacy staff from the pharmacies randomized to CPE, or CPE and EO, were invited to attend one of three CPE sessions arranged at different venues in the Grampian region. Pharmacists received 2.5 hours SCPPE accreditation for their attendance. Locum costs and travel expenses were reimbursed. Each session followed a standard SCPPE format and comprised a 1 hour presentation on vulvovaginal candidiasis by a consultant of genito-urinary medicine. This was followed by a 90 min case study workshop during which the participants were asked to apply the guideline recommendations. Pharmacies randomized to CPE and EO were invited to attend the CPE session prior to their outreach visit.

Outcome measures
There are major difficulties in identifying and following-up patients in community pharmacy settings. Previous studies have involved pharmacists recruiting customers; however, this could lead to potential selection bias (if pharmacists selectively recruited patients with certain characteristics, e.g. patients whose care was compliant with guideline recommendations) and an enhanced Hawthorne effect (if recruitment of patients reminds pharmacists of their involvement in the trial). Furthermore, the absence of formal patient registration with a single pharmacist may lead to poor response rates compared with similar methods used successfully in general practice. To overcome these problems, covert simulated patient visits were used to collect data from pharmacies. A simulated patient is an individual trained to present a particular scenario (e.g. a pregnant woman requiring treatment) to staff whose work is being assessed. This is a reliable method for assessing professional performance and has been used widely.

Ten local amateur actors were recruited and trained to make simulated patient visits. Members of staff, with experience in the training and use of simulated patients, from the Interactive Skills Unit (ISU), Department of Primary Care and General Practice at the University of Birmingham, provided an intensive 2-day training programme. Pilot pharmacy visits were made during the training weekend under the observation of trainers. Two additional half-day training sessions were provided at the actors’ request.

The primary outcome measure was the proportion of visits resulting in an appropriate sale or non-sale of an anti-fungal product (based upon the guideline recommendations) using seven scenarios. A pilot questionnaire was conducted outside the study area to identify the most common ways women present in pharmacies for the treatment of vaginal candidiasis. The scenarios were devised using the survey results. With four scenarios, the sale of an anti-fungal was appropriate and with three inappropriate. Appropriateness was defined by the vaginal candidiasis guidelines that were used in the trial.

The scenarios were randomized across actors. Each pharmacy was visited seven times (twice before the intervention between March and April 2000 and five times after the intervention between July and November 2000), with a different scenario presented on each occasion. The order of the scenarios was randomized across the pharmacies. No pharmacy received more than one visit each month or the same scenario more than once. No actor visited the same pharmacy more than once. The randomization schedule ensured that any learning effect by the actors or the pharmacies (that could lead to poor inter-rater reliability) would not bias the evaluation.

Following each visit, the actor completed an assessment form, recording details of their interaction and the outcome of their visit (including sale/no sale, product details and the member of staff involved in interaction, e.g. pharmacist, assistant). If pharmacy staff suspected a visit, they were asked to provide details of the date and time of the visit, and a brief description of the ‘suspect’.

Questionnaire survey
A questionnaire survey before and after the trial assessed pharmacists’ attitudes towards the treatment of vaginal candidiasis and their knowledge of the treatment of this infection. The survey was mailed to pharmacists in participating pharmacies.

Sample size and statistical analyses—power and data analysis
Sixty practices receiving five post-intervention visits would allow the detection of a difference of 20% in appropriate actions (from 40 to 60%) with 80% power at the 5% significance level. An intra-class correlation of 0.15 was assumed (based upon estimates derived from a previous study in the same setting). The factorial design enabled the effectiveness of two dissemination strategies (EO and CPE) to be evaluated within the same trial. All analyses accounted for clustering of visits within pharmacies and baseline appropriateness using generalized estimating equations (GEE) with robust standard errors. To test the effectiveness of each dissemination strategy, two GEE models with an interaction term between study period (baseline/follow-up) and intervention (EO/CPE) was fitted. The association between member of staff involved during the actor visit and appropriateness of outcome was assessed using the chi-square test, with an adjustment for clustering. The Mann–Whitney test was used to analyse the questionnaire results.

Health economic analysis
Costs were collected for the development of the guideline and for the dissemination strategies. The costs included actual outlays (direct costs) for staff and consumables required to develop the guideline and to implement the dissemination strategies, and also the
opportunity cost of time attending meetings or educational interventions. Travel costs for car use were calculated using both marginal and average cost per mile. With regard to the opportunity costs of time, a number of assumptions were made for time outside normal working hours, ranging from a zero cost to gross employment costs. For the dissemination strategies, costs were considered on the basis of the cost per pharmacy and the cost per person reached by each method.

Results

Recruitment and participation in interventions
Sixty-one of 121 eligible pharmacies were recruited and randomized (Fig. 1). Two pharmacies shared the same pharmacist and were randomized and treated as one pharmacy for the purpose of the study. The groups were comparable with respect to location and type of pharmacy (Table 2). Twenty-nine pharmacies (97%) received an EO visit between May and June 2000. One pharmacy could not be visited within the study timetable. No statistical differences were shown between the two outreach visitors in terms of the proportion of simulated patient visits that resulted in an appropriate outcome. At least one member of staff from 24 (80%) of the pharmacies allocated to these groups attended one of the CPE sessions between May and June 2000.

One hundred and nineteen (99%, 119/120) baseline and 295 (98%, 295/300) follow-up simulated patient visits were completed correctly. One baseline visit was made to the wrong pharmacy and was excluded. The

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**TABLE 2  Characteristics and outcomes in the four randomized groups**

<table>
<thead>
<tr>
<th>Location of practice</th>
<th>Control (n = 15)</th>
<th>Educational outreach (EO) (n = 15)</th>
<th>Continuing education (CPE) (n = 15)</th>
<th>CPE + EO (n = 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>3 (20%)</td>
<td>4 (27%)</td>
<td>5 (33%)</td>
<td>3 (20%)</td>
</tr>
<tr>
<td>Town</td>
<td>4 (27%)</td>
<td>4 (27%)</td>
<td>2 (13%)</td>
<td>4 (27%)</td>
</tr>
<tr>
<td>Urban</td>
<td>8 (53%)</td>
<td>7 (47%)</td>
<td>8 (53%)</td>
<td>8 (53%)</td>
</tr>
<tr>
<td>Type of pharmacy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>7 (47%)</td>
<td>7 (47%)</td>
<td>6 (40%)</td>
<td>5 (33%)</td>
</tr>
<tr>
<td>Small chain</td>
<td>4 (27%)</td>
<td>5 (33%)</td>
<td>4 (27%)</td>
<td>5 (33%)</td>
</tr>
<tr>
<td>Large chain</td>
<td>4 (27%)</td>
<td>3 (20%)</td>
<td>5 (33%)</td>
<td>5 (33%)</td>
</tr>
<tr>
<td>Baseline visits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resulting in</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>appropriate outcome</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n = 108)</td>
<td>10 (37%)</td>
<td>11 (41%)</td>
<td>10 (37%)</td>
<td>10 (37%)</td>
</tr>
<tr>
<td>Follow-up visits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resulting in</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>appropriate outcome</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n = 276)</td>
<td>24 (35%)</td>
<td>32 (46%)</td>
<td>25 (36%)</td>
<td>24 (35%)</td>
</tr>
</tbody>
</table>
same actor had other inconsistencies with her visits and data; therefore, all her visits (n = 36) were excluded from all analyses. Her data accounted for 12 baseline visits (including the incorrect one) and 24 follow-up visits. Therefore, the analyses are based on 108 baseline visits and 276 post-intervention visits.

Descriptive data on appropriateness for baseline and follow-up visits by randomized group are presented in Table 2. No statistically significant interaction between the two implementation strategies was found \( P = 0.27 \) for the interaction term, estimated using post-intervention data from the GEE model with EO, CPE and the interaction term (EO and CPE) fitted. Appropriateness at baseline was similar for EO compared with no EO (39% versus 37%) and CPE compared with no CPE (37% versus 39%). In the follow-up period, the proportion of visits with an appropriate outcome was similar across EO compared with no EO (41% versus 36%), and CPE compared with no CPE (36% versus 41%). Further analysis using GEE models with robust standard errors to adjust for clustering of visits and baseline appropriateness showed no statistically significant effect of EO (odds ratio = 1.13; 95% CI 0.52–2.45) nor CPE (odds ratio = 0.88; 95% CI 0.41–1.91) on appropriateness.

**Secondary findings**

The type of staff member (i.e. pharmacist, pharmacy assistant) who served the simulated patients during their visit could not be identified in 131 (34%) simulated patient visits. Of the 253 visits where the type of staff member could be identified, 14% (n = 36) involved pharmacists only, 55% (n = 140) involved pharmacy assistants only and 30% (n = 77) involved both pharmacists and assistants. Significant variation in appropriateness of outcome occurred depending on the member of pharmacy staff serving the simulated patient (adjusted chi-squared = 24.1, df = 3, \( P < 0.0001 \)). Visits that involved both a pharmacist and pharmacy assistant achieved more appropriate outcomes 61% (n = 47) than those involving only pharmacists alone 53% (n = 19), or only pharmacy assistants 31% (n = 44). There was substantial variation across the seven scenarios in the proportion of appropriate outcomes (Table 3), ranging from 0 to 100%.

**Questionnaire survey**

Completed questionnaires were returned from 52 (87%) pharmacies at baseline, and 50 (83%) at follow-up. No significant changes were shown following either intervention in the five knowledge items (Table 4). The pharmacists had high knowledge scores in the baseline survey that did not increase with either intervention.

**Economic evaluation**

The cost of the guideline development was between £10 046 and £11 117 depending upon the assumptions made about opportunity costs of time and about travel costs. This gives a cost of £167–£185 per study pharmacy (n = 60), but the cost would fall rapidly if wider dissemination were undertaken and would be <£20 per pharmacy across Scotland.

Postal dissemination of the guideline cost <£1 per pharmacy. EO costs were £5242–£6815 (£181–£235 per pharmacy; £39–£51 per person seen). CPE costs were £2409–£5290 (£80–£176 per pharmacy; £36–£79 per person) (Table 5). The comparative costs of EO and CPE depend upon the assumptions made about the opportunity cost of the time forgone by pharmacists and counter assistants. If it is assumed that EO has low opportunity costs, because it takes place while the pharmacy remains open, and CPE has high opportunity costs, because it takes place in the pharmacists’ own time, then the total costs of the two interventions would be similar and the cost per person would be lower for EO. As no significant effect was found for the dissemination interventions, no further economic analysis was undertaken.

**Discussion**

**Principal findings**

This is the first RCT to evaluate the relative effectiveness of educational methods as guideline implementation strategies in the community pharmacy setting. No significant behaviour change in appropriateness of antifungal sales was shown with either strategy.

**Strengths and weaknesses of the study**

This study used a robust design to estimate the effects of two commonly used interventions.

Twenty per cent of pharmacies were not represented at the CPE meetings, and an additional 20% were represented by one pharmacist only. This may have reduced the effectiveness of the intervention but reflects normal behaviour and the pragmatic evaluation used in this study.

All but one of the outreach visits was completed as planned. In this current study, two outreach visitors were used to increase the generalizability of the findings. However, as the visitors were an integral part of the outreach intervention, the outcome was dependent on the skill and enthusiasm with which they delivered the intervention.

The proportion of simulated patient visits resulting in an appropriate outcome did not vary between baseline and follow-up. The variation in appropriate outcomes across the seven scenarios, however, highlights the importance of using a range of scenarios that have been carefully selected to test the behaviour change strategy.

The exclusion of one actor’s data was unfortunate but necessary. Her visits (n = 36) accounted for 9% of the data. Despite this, the ICC for post-intervention data was 0.055; therefore, even with the loss of these data, the
Table 3  Type and number of anti-fungal sale by scenario

<table>
<thead>
<tr>
<th>Product</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
<th>Scenario 4</th>
<th>Scenario 5</th>
<th>Scenario 6</th>
<th>Scenario 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woman presents requesting</td>
<td>“Tube of Canesten”</td>
<td>“Tube of Canesten”</td>
<td>“Something for thrush”</td>
<td>“Something for thrush”</td>
<td>Treatment for “itch down below”</td>
<td>Treatment for “itch down below”</td>
<td>“Diflucan”</td>
</tr>
<tr>
<td>Appropriate outcome</td>
<td>Sale</td>
<td>No sale</td>
<td>No sale</td>
<td>Sale</td>
<td>Sale</td>
<td>No sale</td>
<td>Sale</td>
</tr>
<tr>
<td>Reason for non-sale</td>
<td>Frequent episodes</td>
<td>Symptoms suggestive of bacterial infection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clotrimazole 1%</td>
<td>29</td>
<td>30</td>
<td>5</td>
<td>6</td>
<td>14</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Clotrimazole 2%</td>
<td>24</td>
<td>18</td>
<td>5</td>
<td>15</td>
<td>11</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>Clotrimazole 10%</td>
<td>1a</td>
<td>1</td>
<td>2</td>
<td>4a</td>
<td>4a</td>
<td>1</td>
<td>1a</td>
</tr>
<tr>
<td>Clotrimazole combi</td>
<td>5a</td>
<td>7</td>
<td>23</td>
<td>18a</td>
<td>19a</td>
<td>2</td>
<td>2a</td>
</tr>
<tr>
<td>Clotrimazole 500 mg pessary</td>
<td>1a</td>
<td>2</td>
<td>3a</td>
<td>4a</td>
<td>4a</td>
<td>2b</td>
<td>1a</td>
</tr>
<tr>
<td>Fluconazole</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>1a</td>
<td>1a</td>
<td>0</td>
<td>34a</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total external (% total sales)</td>
<td>53 (88.3%)</td>
<td>48 (82.8%)</td>
<td>10 (22%)</td>
<td>21 (44%)</td>
<td>25 (43%)</td>
<td>14 (70%)</td>
<td>10 (21%)</td>
</tr>
<tr>
<td>Total sales</td>
<td>60</td>
<td>58</td>
<td>45</td>
<td>48</td>
<td>58</td>
<td>19</td>
<td>48</td>
</tr>
<tr>
<td>Total non-sales</td>
<td>0</td>
<td>2a</td>
<td>3a</td>
<td>0</td>
<td>2</td>
<td>41a</td>
<td>0</td>
</tr>
<tr>
<td>Total visits</td>
<td>60</td>
<td>60</td>
<td>48</td>
<td>48</td>
<td>60</td>
<td>60</td>
<td>48</td>
</tr>
<tr>
<td>No. (%) of appropriate outcomes pre-interventiond</td>
<td>1 (8%)</td>
<td>0</td>
<td>0</td>
<td>10 (83%)</td>
<td>13 (54%)</td>
<td>5 (42%)</td>
<td>12 (100%)</td>
</tr>
<tr>
<td>No. (%) of appropriate outcomes post-interventione</td>
<td>6 (13%)</td>
<td>2 (6%)</td>
<td>3 (8%)</td>
<td>17 (47%)</td>
<td>15 (42%)</td>
<td>36 (75%)</td>
<td>26 (72%)</td>
</tr>
</tbody>
</table>

a Represents scenario resulting in an appropriate outcome.
b One Clotrimazole 1% cream also sold with pessary.
c One Clotrimazole 2% cream also sold with pessary.
d Pre-intervention chi-square = 59.3, df = 6, P < 0.001.
e Post-intervention chi-square = 90.0, df = 6, P < 0.001.

Table 4  Knowledge items from questionnaire survey

<table>
<thead>
<tr>
<th>Knowledge item</th>
<th>Baseline</th>
<th>Follow-up</th>
<th>P-valuea</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>Median</td>
<td>n</td>
<td>Median</td>
</tr>
<tr>
<td>Antibiotics can predispose a customer to vaginal thrush</td>
<td>52</td>
<td>1</td>
<td>50</td>
</tr>
<tr>
<td>Elderly (&gt;60 years) customers should not use OTC anti-fungal preparations</td>
<td>48</td>
<td>2</td>
<td>49</td>
</tr>
<tr>
<td>If I recommend an OTC anti-fungal preparation, I will reduce the risk of the infection spreading</td>
<td>51</td>
<td>3</td>
<td>50</td>
</tr>
<tr>
<td>Women who are pregnant should not use OTC anti-fungal preparations</td>
<td>51</td>
<td>3</td>
<td>49</td>
</tr>
<tr>
<td>I only recommend OTC anti-fungal preparations if the customer has a previous diagnosis of vaginal thrush</td>
<td>52</td>
<td>2.5</td>
<td>50</td>
</tr>
</tbody>
</table>

Seven point scale (1–7, strongly agree to strongly disagree).
a Mann–Whitney.
study had 85% power to detect a difference of 20% in appropriateness. Additionally, the analysis incorporated baseline visit data, thus increasing study power further.

The results of the questionnaire study show that the pharmacists had good baseline knowledge of the treatment of vaginal candidiasis, and that this knowledge remained relatively unchanged throughout the trial. This suggests that either pharmacists’ knowledge was not the major barrier to guideline implementation in this setting and might explain why the predominantly educational interventions were ineffective, or that the survey questions were not sufficiently discriminating. Other barriers to guideline implementation might be more important in this setting, e.g. pharmacists’ perceptions of customer expectations or the lack of private consulting areas.

CPE represents the current predominant method of dissemination of information for pharmacists (although not usually pharmacy assistants) in the UK. This approach possibly is most useful if pharmacists have educational or motivational barriers to behaviour change. In this study, despite being well received, CPE did not lead to changes in professional behaviour. This study highlights the need for further research into the effectiveness of pharmacist CPE. Policy makers and educators should not depend solely upon this intervention to ensure quality of care.

This study provided no evidence to support the introduction of EO without further evaluation. This would require considerable system reorganization and shifting of resources.

Fewer than one-third of visits that involved a pharmacy assistant resulted in an appropriate outcome. There is no requirement for pharmacy assistants and technicians to undertake CPE. This issue needs to be addressed with some urgency.

Conclusions
EO visits and CPE (using interactive workshops) have been shown previously to be effective in achieving behavioural change in non-pharmacy settings. The lack of effect shown with these interventions in this study requires further investigation. Strategies that address barriers to change may be more effective in promoting evidence-based practice than those that do not. Further research is needed to identify barriers to guideline implementation in this setting.

Acknowledgements
We are grateful to all the participating pharmacies. We would like to acknowledge the contribution of Dr Arthur Winfield to the design of the study. The project, the Health Services Research Unit and the Health Economics Research Unit were funded by the Chief Scientist Office of the Scottish Executive Department of Health. The views expressed are those of the authors and not necessarily those of the funding body.

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