Recruitment of women by GPs for Pap tests: a meta-analysis

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SUMMARY
General practitioners (GPs) have a pivotal role to play in recruiting women for Pap tests. In recent times, considerable attention has been paid to the role of reminder systems in encouraging women to have regular Pap tests. Although a number of studies have investigated the effectiveness of reminder systems, there has been no comprehensive review. This paper aims to determine the effectiveness of patient and GP reminders in increasing the proportion of women screened for cervical cancer. Two electronic databases were searched for English-language randomized controlled trials conducted in a general practice or family medicine setting, and examining the effectiveness of GP and patient reminders in increasing the proportion of women screened for cervical cancer. Ten trials were identified, and meta-analytic techniques were employed to analyse the data from these trials. The women whose GPs had been prompted to remind them to have a Pap test were significantly more likely to do so than were control women (typical risk difference (TRD) = 6.6%, 95% CI = 5.2%–8.0%). The typical risk difference for the patient reminder studies was 4.9% (95% CI = 2.6%–7.2%). In both cases, sensitivity analysis revealed that one study stood out as an exceptional result. The omission of this study induced heterogeneity among the remaining studies. Once this study was removed, the TRDs for the GP reminder and patient reminder studies were 7.9% (95% CI = 6.5%–9.4%) and 10.8% (95% CI = 8.1%–13.6%), respectively. The results strongly suggest that GPs should make use of GP and patient reminder systems.

Keywords: cervical screening; recall; meta-analysis.

Introduction
Each year in Australia, over 1000 women are diagnosed with cervical cancer, and about 340 women die from it.1 Regular Pap tests performed in a high proportion of eligible women have the potential to prevent the majority of cases of squamous cervical cancer (the most common form of cervical cancer) by enabling early detection of abnormalities in cells lining the cervix.

GPs have a pivotal role if this reduction is to be achieved. They have an important involvement in all five steps of the screening pathway (Figure 1). They typically know their patients well and are thus able to identify women in need of Pap tests, and encourage those who are reluctant to ensure that they are screened. Being the primary providers of Pap tests, GPs have the opportunity to make sure that the tests they take are of high quality, and they can establish relationships with cytology laboratories and become familiar with reporting terminology. They are also well placed to set up efficient systems for notifying results to women, and recalling them.

In recent times, considerable attention has been paid to the role of reminder systems in improving the effectiveness of the second step in the screening pathway: encouraging women to have regular Pap tests. These reminder systems take two forms. GP reminders involve a prompt for the GP to screen eligible women when they attend for another reason. Patient reminders involve postal or telephone invitations to eligible women to attend for screening. Both require the establishment of some sort of register. Most commonly, computerized age–sex–disease registers are used, but some GP reminder systems take the form of ‘tagged’ notes.

Intuitively, it makes sense that such reminder systems could aid GPs’ ability to encourage women to have regular tests. It is also likely that registers might assist at other steps in the pathway; for example, by increasing GPs’ knowledge of their patients’ screening status and by acting as a system for notifying results to women.

The primary objective of this review was to determine the effectiveness of patient reminder systems and GP reminder systems in promoting uptake of Pap tests. The a priori hypothesis was that both would be more effective than ‘normal care’ in doing so.

Method

Article search and selection strategy
A search was conducted using WINSPIRS of MEDLINE and PSYCHLIT from the year of their inception to December 1996. The search aimed to retrieve English-language articles containing the following elements (truncated search terms are listed in brackets):

- randomized controlled trials (RANDOM*; TRIAL)
- general practice setting (GENERAL PRAC*; GENERAL PHYSICIAN; FAMILY PHYSICIAN; FAMILY PRAC*; PRIMARY CARE*; PRIMARY HEALTH CARE*)
- GP reminder systems or patient reminder systems (REMINDER; RECALL; CALL; TAG*; SYSTEM*; REGISTER*)
- Pap tests (CERVI*; PAP*; SMEAR; TEST).

Potentially relevant references were retrieved by this means, and their reference lists scanned for further possible articles. An attempt was also made to discover unpublished reports of relevant trials, but this yielded no additional studies. A total of 14 references were retrieved.

Studies were included if they had been conducted in a general practice or family medicine setting, and if it could be established that subjects had been randomly allocated (at the patient level, the GP level, or the practice level) to intervention and control.
ized reminders. One article was excluded because it reported intervention group and the control group GPs received computerized uptake for intervention and control groups can be obtained from the authors.

Details of numerators and denominators for the rates of screening uptake for intervention and control groups were reorganized in some way that prompted the GP to take the same action: either marking the woman's notes in registers, which contained relevant information about a given woman, or by date of previous Pap test. In total, 10 studies were included in the meta-analysis, each of which investigated the impact of reminders on uptake by women defined as eligible by age group and hysterectomy status, and, in some cases, by date of previous Pap test.

Two of these studies examined the effectiveness of GP reminders group(s). The GPs of eligible women in the GP reminders intervention groups were prompted to invite these women to have a Pap test when they presented for some other reason. Women in the patient reminders intervention groups received invitations to attend for a Pap test in general, women in control groups received ‘normal care’.

Two studies were excluded because there was no no-treatment control group, and one study was excluded because both the intervention group and the control group GPs received computerized reminders. One article was excluded because it reported the same results as another paper.

**Data extraction**

Data were extracted in such a way as to present the proportion of women screened within a defined interval in intervention and control groups(s). In some cases, data had to be reorganized in order for results to be expressed in this form. It was considered preferable to do this, rather than to reject these studies. Where there were two interventions of the same type (e.g. an invitation letter alone and an invitation letter with a specific appointment time), results were combined into one rate. Each analysis was conducted on an intention-to-treat basis, with a loss to follow-up being regarded as a failure to take up the option of a Pap test. Details of numerators and denominators for the rates of screening uptake for intervention and control groups can be obtained from the authors.

Data were extracted by one of the authors (JP) and reviewed by the other two (DJ and DD). Any discrepancies were discussed, and resolved by consensus.

**Quality ratings**

Each study was rated in terms of its quality or data integrity, according to six criteria:

1. adequacy of sampling frame,
2. rigour of randomization,
3. effectiveness of randomization (e.g. extent of imbalances in confounders between intervention and control groups),
4. adequacy of description of the experiences of intervention and control groups,
5. lack of bias in assessment of outcomes, and
6. extent to which assumptions had to be made in order to present the data in terms of rates.

Each of these criteria were scored on a scale of 1–5 (with 1 being poor and 5 being excellent), and then an average quality score was generated for each study.

Quality ratings were made independently by two of the authors (DD and JP). Where there were discrepancies, a final rating was arrived at by consensus.

**Data analysis**

Studies were combined using a method adapted from Fleiss and Gross. A ‘typical’ or summary risk difference (‘TRD’) across all studies was computed using a weighted average of risk differences, with weights inversely proportional to the variance of the estimator. The risk difference measure of effect was chosen because its reciprocal, the ‘number needed to treat’ is interpretable in clinical, economic, and evaluation terms as the number of women for whom either GP or patient reminders need to be generated in order to achieve one additional Pap test.

Homogeneity of component studies was assessed using a random effects model, as proposed by DerSimonian and Laird. Total weighted squared deviations from the summary risk difference were computed and compared to a chi-squared distribution with degrees of freedom one fewer than the number of studies. Sensitivity analyses were performed by the progressive omission of each study from the combined analysis and recomputation of the summary risk difference and homogeneity chi-squared statistics.

**Results**

**Characteristics of the studies**

In total, 10 studies were included in the meta-analysis, each of which investigated the impact of reminders on uptake by women defined as eligible by age group and hysterectomy status, and, in some cases, by date of previous Pap test.

Two of these studies examined the effectiveness of GP reminders alone, four investigated the impact of patient reminders alone, and four dealt with both types of intervention. Table 1 describes the characteristics of these studies.

The majority of GP reminders took the form of computerized registers, which contained relevant information about a given woman’s screening status and prompted the GP to invite her to be screened if she attended his/her practice for some other reason. The alternative to this was marking the woman’s notes in some way that prompted the GP to take the same action: either by ‘tagging’ them, or by appropriately inserting a ‘preventive care flow sheet’. Normally these interventions were delivered alone, but in two studies the GP reminders were accompanied by educational and administrative input. In these latter studies, GPs
| Trial                  | Country       | Trial type               | Patient reminders                                                                 | GP reminders                                                                 | Control group                      | Preventive activity                  | Outcome measure                          | Length of follow-up | Quality rating |
|-----------------------|---------------|--------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------|----------------------------------------|------------------------------------------|---------------------|----------------|}
| Pritchard et al, 1995 | Australia     | GP and patient reminders | Invitation letter only or invitation letter with appointment (interventions combined for meta-analysis): n = 374 | Tagged notes: n = 198                                                       | Normal care: n = 185               | Pap test only                          | Pap test done, as recorded by GP                 | 12 months           | 3.92            |}
| Ornstein et al, 1991  | USA           | GP and patient reminders | Invitation letter (plus GPs received educational and administrative input): n = 1167 | Computerized reminders (plus GPs received educational and administrative input): n = 1230 | GP received educational and administrative input: n = 954 | Pap test and 4 other preventive measures | Proportion of patients adhering to Pap test recommendations | 12 months           | 2.58            |}
| McDowell et al, 1989  | Canada        | GP and patient reminders | Invitation letter or telephone call (interventions combined for meta-analysis): n = 744 | Computerized reminders: n = 332                                                | Normal care: n = 330               | Pap test only                          | Pap test done, as evidenced by computer entry. Pap tests done elsewhere accepted if confirmed. | Max. of 12 months | 3.00            |}
| Pierce et al, 1989    | UK            | GP and patient reminders | Invitation letter: n = 140                                                      | Tagged notes: n = 142                                                        | Normal care: n = 134               | Pap test only                          | Pap test done, as assessed by GP               | 12 months           | 3.00            |}
| McPhee et al, 1989    | USA           | GP reminders             | Computerized reminders: n = 432                                                  | Not described: n = 432                                                       | Pap test and 6 other preventive measures | Proportion of eligible patients tested at least once during study period, expressed as a proportion of those who should have been tested | 9 months            | 2.50            |}
| McPhee et al, 1991    | USA           | GP reminders             | Computerized reminders: n = 711                                                  | Not described: n = 711                                                       | Pap test and 10 other preventive measures | Proportion of eligible patients tested at least once during study period, expressed as a proportion of those who should have been tested | 12 months           | 2.50            |}
| McDonald et al, 1984  | USA           | GP reminders             | Computerized reminders: n = 4052                                                  | No reminders issued, but the computer executed the reminder logic and kept records of indications for actions, just as it did for the intervention teams: n = 4052 | Pap test and 14 other preventive measures | Percentage response rate to indications | Pap test done, as recorded by GP | 2 years             | 2.25            |}
| Dietrich et al, 1992  | UK            | GP reminders             | Preventive care flow sheets in patients' records alone and combined with GP education (interventions combined for meta-analysis): n = 302 | Not described: n = 401                                                       | Pap test and 9 other preventive measures | Self-reported proportion of appropriate patients from each practice receiving services during previous 12 months | 12 months           | 2.42            |}
| Lantz et al, 1995     | USA           | Patient reminders        | Invitation letter: n = 236                                                        | Normal care: n = 238                                                        | Pap test and mammogram             | Pap test done, as recorded by GP                 | Pap test done, as recorded by GP               | 6 months             | 3.83            |}
| Bowman et al, 1995    | Australia     | Invitation              | Invitation letter: n = 220                                                        | Not described: only                                                        | Pap test validated by HIC data       | Self report of Pap test, validated by HIC data | Pap test validated by HIC data               | 6 months             | 3.33            |
in the control groups also received educational and administrative input. In all other studies, control GPs delivered ‘normal care’.

Patient reminders tended to take the form of a letter of invitation to the woman from her GP. Variations included a letter containing a specific appointment, and a telephone reminder from the practice nurse. Again, these interventions were normally delivered in isolation (and compared with ‘normal care’), but, in one study, GPs who delivered patient reminders also received educational and administrative input (as did their controls).

The studies ranged in quality from ratings of 2.25 to 3.92. Those that scored at the lower end of the scale tended to be ones in which the original sampling frame resulted in there being many ineligible women included in the study; the randomization process was not described, was subject to bias and appeared ineffective; or considerable back-calculation was necessary to transform the data into appropriate rates. In practice, most of the studies that manifested these problems were ones where the randomization had taken place at the level of the GP (or practice) rather than at the patient level.

Effectiveness of reminders
Figure 2 shows the results of pooling the data from the GP reminder and patient reminder studies. This figure presents study-specific risk differences and 95% confidence intervals.

Women whose GPs had been prompted to remind them to have a Pap test were significantly more likely to do so than were control women (TRD 6.6%, 95% CI 5.2%–8.0%). The corresponding estimate of the number of women needed to be involved in a GP reminder scheme in order to generate one additional screen is 15.2 (95% CI 12.6–19.3).

However, there was considerable heterogeneity between studies. Sensitivity analysis revealed that the single study by Ornstein et al stood out as an exceptional result. When this study was omitted, the remaining set of seven studies were homogeneous, with a typical risk difference of 7.9% (95% CI 6.5%–9.4%).

The TRD for the group of six patient reminder studies was 4.9% (95% CI 2.6%–7.2%). The corresponding estimate of the number of women needed to be sent reminder letters, per additional screen, is 20.3 (95% CI 13.9–38.2). Again, there was considerable heterogeneity introduced by the inclusion of Ornstein et al’s study. The removal of this study again induced homogeneity among the remaining studies (TDR 10.8%, 95% CI 8.1%–13.6%).

Weighting the results of each study for quality using the ratings in Table 1 made negligible difference to the overall results.

Discussion
The results of this meta-analysis indicate that both GP reminders and patient reminders can be effective tools in a crucial step of the screening pathway — encouraging women to have regular Pap tests. This has clear implications for women in terms of morbidity and mortality from cervical cancer.

Arguably, patient reminders would appear to be more effective than GP reminders when compared with normal care, with risk differences of 10.8% and 7.9% respectively. However, this should be interpreted with caution, since some studies were included in both the GP reminders analysis and the patient reminders analysis, and were thus not from independent sets of results. Having said this, the greater effectiveness of patient reminders is consistent with the findings of all individual studies that specifically compared the two types of interventions, with the exception of the Ornstein et al study.

It is acknowledged that there were some differences between studies in terms of the nature of the intervention, both within the group of GP reminder studies and the group of patient reminder studies. However, with the exception of the study by Ornstein et al, there was no heterogeneity between studies, indicating that these differences had no quantitative effect. This is positive, because it indicates that the meta-analysis was robust to variations in the precise nature of the intervention, and therefore engenders confidence that the results can be generalized to recall systems as a whole.

Several caveats should be stated. First, the results should be interpreted within the context of the method of the meta-analysis. Despite the best efforts of the authors, it may be that there were some unpublished studies that were missed, which may have had negative results. Secondly, back-calculation required to transform the data into comparable rates was necessarily dependent on some interpretation and extrapolation of the results presented in the original papers. Considerable caution was exercised in undertaking this back-calculation (details of the manner in which each figure was derived can be obtained from the authors). Any differences between the original results and those presented here would be expected to be negligible.

Thirdly, in those studies that were randomized by practice, the results were presented at the practice level, usually as some sort of GP performance score. In order for comparisons to be made with other studies, these performance scores were converted into patient uptake rates and analysed at the patient level. It is acknowledged that there may have been some interdependence between clusters of patients from the same practice, and ideally this would have been adjusted for in the analysis. This was not possible in the current circumstances. However, these studies were down-weighted in the quality ratings, and their lower ratings made negligible difference to the overall results.
Fourthly, the studies differed in their length of follow-up, with periods ranging from six months to two years. It is unclear what the effect of this might be on the results. One argument might be that a shorter follow-up might lead to a lower risk difference because there would be less opportunity for women to receive screening. On the other hand, a lower risk difference might occur in the case of a longer follow-up because of an attenuation effect.

Finally, effectiveness is not synonymous with cost-effectiveness. This meta-analysis could not assess cost-effectiveness, since data on costs were not available in the majority of studies. The one study that systematically reported costs in a follow-up paper suggested that, although patient reminders were more effective, GP reminders were much more cost effective because of their opportunistic approach (making use of an existing consultation to undertake preventive activities).

Although these caveats are acknowledged, the results strongly suggest that GPs should make use of GP and patient reminder systems. This is not to suggest that such reminder systems should take the place of national registers (or their equivalent), which obviously have clear advantages in terms of their coverage. Instead, GP and patient reminders should be viewed as complementing these larger registers, having the advantage of a more personalized and sometimes more timely approach, and being able to pick up women who have previously never been screened.

It is acknowledged that establishing registers requires some investment in terms of time, effort, and money on the part of the GP, and that, in the past, GPs have not always been in a position to make the required changes to their practice. However, there are many systemic and structural changes occurring in Australia and overseas that favour the establishment of reminder systems. Such information management will become increasingly important as individual GPs work more collaboratively and their funding structures change.

References

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