User-experience surveys with maternity services: a randomized comparison of two data collection models

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Abstract

Objective. To compare two ways of combining postal and electronic data collection for a maternity services user-experience survey.


Setting. Maternity services in Norway.

Participants. All women who gave birth at a university hospital in Norway between 1 June and 27 July 2010.

Intervention. Patients were randomized into the following groups (n = 752): Group A, who were posted questionnaires with both electronic and paper response options for both the initial and reminder postal requests; and Group B, who were posted questionnaires with an electronic response option for the initial request, and both electronic and paper response options for the reminder postal request.

Main outcome measures. Response rate, the amount of difference in background variables between respondents and non-respondents, main study results and estimated cost-effectiveness.

Results. The final response rate was significantly higher in Group A (51.9%) than Group B (41.1%). None of the background variables differed significantly between the respondents and non-respondents in Group A, while two variables differed significantly between the respondents and non-respondents in Group B. None of the 11 user-experience scales differed significantly between Groups A and B. The estimated costs per response for the forthcoming national survey was €11.7 for data collection Model A and €9.0 for Model B.

Conclusions. The model with electronic-only response option in the first request had lowest response rate. However, this model performed equal to the other model on non-response bias and better on estimated cost-effectiveness, and is the better of the two models in large-scale user experiences surveys with maternity services.

Keywords: data collection, questionnaires, patient satisfaction, randomized controlled trial, maternal health services

Introduction

The patient perspective is central in health-care quality evaluations. Many approaches are used to measure and represent the patient perspective, but the use of large-scale postal surveys of user-reported experiences and satisfaction is a common method in many Western countries [1]. However, low response rates threaten the credibility and validity of such surveys. In Norway, national patient-experience surveys for hospitals and specialized mental health-care institutions have produced relatively low response rates, and these decline over time [2–4]. Similar changes have been documented in the Netherlands [5].

There are generally two types of research related to survey non-response in health-services research. First, effect studies explore initiatives in order to increase the response rate. A systematic review identified several effective initiatives for postal surveys, including monetary incentives, recorded delivery and having a more interesting survey topic [6]. Within the patient-satisfaction field, reviews of the literature have revealed large differences in response rates between different data collection modes, with postal surveys producing the lowest response rates [7, 8]. The second research approach used to investigate survey non-response is assessing the degree of non-response bias. Several methods can be applied...
for this, such as securing relevant variables in the sampling frame and analysing differences between respondents and non-respondents for these variables, or follow-up studies of non-respondents [9]. Few patient satisfaction studies are aware of and assess the amount of non-response bias [8].

The Norwegian Knowledge Centre is in the process of developing methods for a national survey on user experiences within the maternity services. A review of the literature showed that there is a large variation in response rates between studies, with the poorest being as low as 44% [10]. Most of those national surveys have employed postal questionnaires as the data collection method, which is also the standard procedure for national user-experience surveys in Norway. However, women of childbearing age represent a relatively young population, and are therefore presumably more familiar with the Internet than are older patient groups. Moreover, web-based surveys are generally less costly than postal surveys [11, 12], although they are also associated with lower response rates [13, 14]. Therefore, we decided to assess electronic data collection as a supplement to the standard postal data collection mode.

Based on the limited research evidence and uncertainty related to the generalizability to the current context, we conducted a randomized trial among women discharged from a university hospital in Norway with the following groups: Group A, who were posted questionnaires with both electronic and paper response options for both the initial and reminder postal requests; and Group B, who were posted questionnaires with an electronic response option for the initial request, and both electronic and paper response options in the reminder. The objective of this study was to compare these two ways of combining postal and electronic data collection. The two models will be compared on four main outcome measures: (i) response rate, (ii) the amount of difference in background variables between respondents and non-respondents, (iii) main study results and (iv) estimated cost-effectiveness. We assessed costs for each data collection model by estimating total costs and cost-effectiveness in the forthcoming national survey.

**Methods**

**Data collection**

All women who gave birth at a university hospital in Norway between 1 June and 27 July 2010 were included. The death of the mother or infant was used as an exclusion criterion. A total of 752 women were sent out questionnaires in the study, of which 18 were returned due to incorrect contact information, giving a final total of 734. The hospital transferred data about the included women to the Knowledge Centre, including their contact information, age, admission type, length of stay and diagnosis.

A total of 752 women were assessed for eligibility and included in the study (Fig. 1). The included women were

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**Figure 1** CONSORT flow diagram.
randomly assigned to Group A (n = 383) and Group B (n = 369). The information letter in the first survey request was the same for both groups, the only exception being the inclusion of an Internet link, user name and password for Group B. The second survey request was made to non-respondents 3 weeks after posting the initial request, with both groups presented with an opportunity to answer via either post or the Internet.

The Regional Committee for Medical and Health Research Ethics approved the study.

**Questionnaire**

The 16-page questionnaire comprised 135 questions about experiences with health-care services during pregnancy and birth, and after birth, and 6 socio-demographic questions [10]. The questionnaire is part of an ongoing development and validation process aiming to deliver standardized, high-quality instruments to a subsequent national survey. To secure content validity, the questionnaire was based on a literature review, qualitative interviews with women and meetings in a reference group for the project consisting of health personnel from the relevant health services [10]. Most of the questions related to the user-reported experiences, and were answered in a five-point response format ranging from ‘not at all’ to ‘to a very large extent’.

Separate exploratory factor analyses were carried out for experiences with health services during pregnancy, with maternity wards, post-natal wards and during the post-natal period, respectively. Principal axis factoring with oblique rotation (promax) was applied. The criterion for the number of factors to be rotated was eigenvalues >1, and items with factor loadings <0.4 were excluded. Cronbach’s α coefficient was calculated to investigate the internal consistency of the scales.

Exploratory factor analysis showed that four underlying dimensions of experiences with health services during pregnancy were identified out of the 20 items included in the analysis, explaining 70% of the total variance. The factors can be described as midwife services, doctor services, information and organization. The α-values met the criterion of 0.7, ranging from 0.92 for midwife services to 0.81 for organization.

The factor analysis for respondents who had experiences from maternity wards produced one factor which accounted for 58% of the total variance. Twelve items were included, and the factor addressed health personnel, information, organization and partner, with an α-value of 0.92.

The factor analysis for users who had experiences from post-natal wards included 16 items and gave three factors that accounted for 70% of the total variance. The factors can be described as health personnel, information-baby and information-mother. The α-values all exceeded 0.70, ranging from 0.93 for health personnel to 0.85 for information-mother.

The factor analysis for users with experiences from post-natal services showed that the 13 items formed three factors, explaining a total of 71% of the total variance and addressing health personnel, information-baby and information-mother. The α-values ranged from 0.91 for health personnel to 0.75 for information-mother.

**Cost estimates**

We estimated costs for each data collection model in the forthcoming national survey. The national survey will be conducted among around 10 000 women. An important input for cost estimates was data collection results in this randomized study, for instance, the percentage of women answering electronically following the first request in each data collection model. We estimated costs for printing and postage based on current market prices for the Knowledge centre, while estimates for resource use and salaries related to packing and scanning questionnaires were based on actual use in previous surveys. Costs relating to infrastructure were not included, for instance, personal computers, scanner and electronic data collection system. The main outcome variables relating to costs were total estimated costs for each data collection alternative, in addition to the estimated costs per response.

**Statistical analysis**

The Pearson χ² statistics were used when comparing the response rates in Groups A and B. The respondents and non-respondents were compared using t-tests for each group individually. Differences between Groups A and B regarding user-reported experiences were tested using t-tests. SPSS version 15.0 was used for statistical analyses.

**Results**

In Group A, 374 women received the survey while 9 women failed to receive the survey due to wrong contact information (Fig. 1). In Group B, 360 women received the survey and 9 were missed because of wrong address information. The response rate for Group A before reminder was 29.1%, of which 6.9% responded electronically and 22.2% responded on paper (Table 1). The response rate for Group B (only electronic response option) was 22.2% before the reminder. The final response rate was significantly higher in Group A (51.9%) than Group B (41.1%).

None of the six background variables differed significantly between respondents and non-respondents in Group A, while the average number of diagnoses and admission types differed significantly between the respondents and non-respondents in Group B (Table 2). None of the 11 user-experience scales differed significantly between Groups A and B (Table 3). The total cost was €60 751 for Group A and €36 966 for Group B, while costs per response was €11.7 and €9.0, respectively (Table 4).
Discussion

This study compared response rates, non-response bias and costs for the following data collection models: Group A, who were posted questionnaires with both electronic and paper response options for both the initial and reminder postal requests; and Group B, who were posted questionnaires with an electronic response option for the initial request, and both electronic and paper response options in the reminder. Group B had lower response rate than Group A, but performed equally well on non-response bias and better on cost-effectiveness.

As in several national user-experience surveys, the response rate was relatively low for both models [2–5]. However, the response rate in itself is a poor predictor of non-response bias [9]. A meta-analysis of the impact of non-response rates on non-response bias revealed high variability in non-response bias within surveys [9]. That is, estimates...
within the same survey might have large and small non-response biases regardless of the overall response rate. Therefore, the main focus should be on the degree of non-response bias for different survey estimates, and not on the response rate itself.

The literature shows that few patient satisfaction studies have assessed the degree of non-response bias [8]. The findings of the present study indicate that either of the evaluated data collection models can be used. However, presenting the postal option at a later stage generated a much higher proportion of electronic responses, in line with the findings of a previous study [12]. Since web surveys are generally cheaper than postal surveys [11, 12], an initial web-only response approach will cost less than the other approach. Our findings also indicate that this approach will produce approximately the same survey estimates as the other model, which concurs with the results of another study on mode effects within the patient experience field [15]. Naturally, an initial web-only procedure would have to account for the lower response rate when calculating the sample size. Furthermore, a sample frame without e-mail contact information limits any savings, since both the initial contact and reminders have to be conducted by post. However, both the estimated total costs and costs per response were substantially better for the model.

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**Table 3** User-experience estimates in the two randomized groups

<table>
<thead>
<tr>
<th>Experiences with health services during pregnancy</th>
<th>Group A: postal distribution with electronic and paper response options in both requests</th>
<th>Group B: postal distribution with electronic response option in first request, and electronic and paper in reminder</th>
<th>P-value$^a$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midwife services</td>
<td>83.82</td>
<td>82.98</td>
<td>ns</td>
</tr>
<tr>
<td>Doctor services</td>
<td>73.16</td>
<td>70.04</td>
<td>ns</td>
</tr>
<tr>
<td>Information</td>
<td>55.79</td>
<td>55.47</td>
<td>ns</td>
</tr>
<tr>
<td>Organization</td>
<td>57.89</td>
<td>54.07</td>
<td>ns</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Experiences with maternity ward</th>
<th>Group A: postal distribution with electronic and paper response options in both requests</th>
<th>Group B: postal distribution with electronic response option in first request, and electronic and paper in reminder</th>
<th>P-value$^a$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health personnel, information, organization and partner</td>
<td>77.45</td>
<td>78.06</td>
<td>ns</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Experiences with post-natal ward</th>
<th>Group A: postal distribution with electronic and paper response options in both requests</th>
<th>Group B: postal distribution with electronic response option in first request, and electronic and paper in reminder</th>
<th>P-value$^a$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health personnel</td>
<td>69.90</td>
<td>69.33</td>
<td>ns</td>
</tr>
<tr>
<td>Information-baby</td>
<td>65.70</td>
<td>64.68</td>
<td>ns</td>
</tr>
<tr>
<td>Information-mother</td>
<td>50.95</td>
<td>46.81</td>
<td>ns</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Experiences with health services during post-natal period</th>
<th>Group A: postal distribution with electronic and paper response options in both requests</th>
<th>Group B: postal distribution with electronic response option in first request, and electronic and paper in reminder</th>
<th>P-value$^a$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health personnel</td>
<td>78.71</td>
<td>75.33</td>
<td>ns</td>
</tr>
<tr>
<td>Information-baby</td>
<td>66.49</td>
<td>67.47</td>
<td>ns</td>
</tr>
<tr>
<td>Information-mother</td>
<td>53.26</td>
<td>50.88</td>
<td>ns</td>
</tr>
</tbody>
</table>

$^a$t-test comparison of Groups A and B; ns, not significant.

**Table 4** Cost estimates for national survey based on data collection results in randomized study (total sample: 10 000)

<table>
<thead>
<tr>
<th>Costs: (€)</th>
<th>Group A: postal distribution with electronic and paper response options in both requests</th>
<th>Group B: postal distribution with electronic response option in first request, and electronic and paper in reminder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Printing questionnaires</td>
<td>4730</td>
<td>3032</td>
</tr>
<tr>
<td>Postage</td>
<td>16 149</td>
<td>6482</td>
</tr>
<tr>
<td>Salaries: packing questionnaires</td>
<td>29 021</td>
<td>21 702</td>
</tr>
<tr>
<td>Salaries: scanning questionnaires</td>
<td>5608</td>
<td>1855</td>
</tr>
<tr>
<td>Envelopes</td>
<td>5243</td>
<td>3895</td>
</tr>
<tr>
<td>Total costs</td>
<td>60 751</td>
<td>36 966</td>
</tr>
<tr>
<td>Costs per response (€)</td>
<td>11.7</td>
<td>9.0</td>
</tr>
</tbody>
</table>
with a web-only response option in the first request. Consequently, this approach has a clear economic advantage.

An important limitation of the current study is that it only included women of childbearing age, raising concerns about the generalizability to other patient groups. Another randomized study within the primary care physician context showed that an initial electronic response option produced a much lower response rate, and actually resulted in a higher cost for the electronic arm than the pure postal data collection arm [15]. Therefore, our findings are restricted to women of childbearing age, and point to the need for more research on this issue with other younger user populations like parents of children, children/teenagers and mental health outpatients. The possibility of lowering costs and presenting adequate response modes to the younger populations are important arguments in favour of such research. Other study limitations are the lack of direct methods for estimating non-response bias, the inclusion of only a small set of socio-demographic variables and the fact that we only tested two of many possible combinations of postal and electronic data collection procedures.

Response rate is often used alone as a data quality indicator, even though it is a poor predictor of non-response bias [9]. What is needed is a broader comparison of different data collection models including response rate, non-response bias and cost-effectiveness. Our study showed that the model with electronic-only response option in the first request had lowest response rate. However, this model performed equal to the other model on non-response bias and better on estimated cost-effectiveness, and is the better of the two models in large-scale user experiences surveys with maternity services.

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