Differences in response rates between mail, e-mail, and telephone follow-up in hand surgery research

Sjoerd P. F. T. Nota · Joost A. Strooker · David Ring

Published online: 28 February 2014
© American Association for Hand Surgery 2014

Abstract

Background There is a need to determine the difference in response to mail, e-mail, and phone in clinical research surveys.

Methods We enrolled 150 new and follow-up patients presenting to our hand and upper extremity department. Patients were assigned to complete a survey by mail, e-mail, or phone 3 months after enrollment, altering the follow-up method every 5 patients, until we had 3 groups of 50 patients. At initial enrollment and at 3 month follow-up (range 2–5 months), patients completed the short version of the Disabilities of the Arm, Shoulder, and Hand questionnaire (QuickDASH), the short version of the Patient Health Questionnaire (PHQ-2), the Pain Self-Efficacy Questionnaire (PSEQ), and rated their pain intensity.

Results The percent of patients that completed the survey was 34 % for mail, 24 % for e-mail, and 80 % for phone. Factors associated with responding to the survey were older age, nonsmoking, and lower pain intensity. Working full-time was associated with not responding.

Conclusions The response rate to survey by phone is significantly higher than by mail or e-mail. Younger age, smoking, higher pain intensity, and working full-time are associated with not responding.

Type of study/level of evidence: Prognostic I

Keywords Follow-up evaluation · Hand surgery research · E-mail · Phone · Mail

Introduction

Follow-up surveys are often used for long-term evaluation of patients in clinical research. The response to mail surveys is often very low raising the concern of bias if responders are different from nonresponders. In our survey studies, about a third of patients return the mailing [4, 8, 9]. Previous studies suggested nonresponders are different from responders with regard to age, gender, pain intensity, marital status, working status, smoking habit [1, 5], and satisfaction with treatment [6]. We wondered if phone or e-mail might improve the response rate.

This study addressed the primary null hypothesis that there is no difference in response rate between three types of follow-up (mail, e-mail, and phone). Secondary analyses assessed the differences between responders and nonresponders for each follow-up type.

Material and Methods

One hundred and eighty-six new and follow-up patients were invited to participate in this institutional review board-approved study during their regular outpatient visit to the hand surgeon. We excluded patients that were pregnant, had no access to internet, or used internet less than once a week. All patients provided informed consent for this prospective cohort study and were enrolled between November 2012 and January 2013. One patient withdrew from the study during the completion of the questionnaires, 1 patient was excluded due to technical malfunction of the electronic data capturing device

D. Ring (✉)
Hand and Upper Extremity Service, Department of Orthopaedic Surgery, Massachusetts General Hospital, 55 Fruit Street, Boston, MA 02114, USA
e-mail: dring@partners.org

S. P. F. T. Nota · J. A. Strooker
Orthopaedic Hand Service, Yawkey Center, Suite 2100, Massachusetts General Hospital, 55 Fruit Street, Boston, MA 02114, USA

during initial enrollment, and 34 patients declined to participate. This resulted in a study sample of 150 patients.

To determine the response rate of different follow-up methods, we asked patients to complete the follow-up questionnaires at 3 months (acceptable range between 2 and 5 months) after the initial enrollment. Subjects were assigned to three different follow-up methods: mail, e-mail, or phone, altering the method of follow-up every five enrolled patients. This resulted in three groups containing 50 patients.

Patients that were assigned to follow-up by mail were sent a postal survey once, containing a letter with instructions, the questionnaires, and a stamped return envelope. The patients that were assigned to follow-up by e-mail were sent one e-mail with instructions and an internet link to the Research Electronic Data Capture (REDCap) survey containing the questionnaires. Patients assigned to follow-up by phone were called on their landline or cell phone, with a maximum of three attempts. There was no difference in the type of

Table 1 Patient Demographics

Parameter	Cohort <i>n</i> =150			Responders <i>n</i> =69			Nonresponders <i>n</i> =81			<i>P</i> value
	Mean	SD	Range	Mean	SD	Range	Mean	SD	Range	
Age (years)	49	17	19–92	53	17	19–84	46	17	19–92	0.0046
Education (years)	16	2.5	10–22	16	2.5	10–22	16	2.4	12–20	0.37
Parameter	Number		%	Number		%	Number		%	
Gender										
Male	72		48	36		52	36		44	0.35
Female	78		52	33		48	45		56	
Type of visit										
New patient	50		33	25		36	25		31	0.49
Follow-up	100		67	44		64	56		69	
Sought treatment for condition before										
Yes	48		32	18		26	30		37	0.15
No	102		68	51		74	51		63	
Other pain conditions										
Yes	48		32	24		35	24		30	0.50
No	102		68	45		65	57		70	
Prior surgery										
Yes	19		13	10		14	9		11	0.54
No	131		87	59		86	72		89	
Marital status										
Single	57		38	22		32	35		43	0.56
Living with partner	2		1.3	1		1.5	1		1.2	
Married	68		45	36		52	32		40	
Separated/Divorced	15		10	6		8.7	9		11	
Widowed	8		5.3	4		5.8	4		4.9	
Working status										
Full-time	93		62	35		51	58		72	0.041
Part-time	10		6.7	6		59	4		4.9	
Homemaker	1		0.67	0		0	1		1.2	
Retired	24		16	17		25	7		8.6	
Unemployed, able to work	4		2.7	3		4.4	1		1.2	
Unemployed, not able to work	10		6.7	5		7.3	5		6.2	
On worker's compensation	2		1.3	0		0	2		2.5	
Currently on sick leave	6		4.0	3		4.4	3		3.7	
Smoking										
Yes	17		11	3		4.4	14		17	0.018
No	133		89	66		96	67		83	

Table 2 Response rate of the 50 patients for each response group

	Cohort <i>n</i> =150		Responders <i>n</i> =69		Nonresponders <i>n</i> =81		
Parameter	Number	%	Number	%	Number	%	<i>P</i> value
Type of follow-up							
Phone	50	33	40	58	10	12	<0.001
Mail	50	33	17	25	33	41	
E-mail	50	33	12	17	38	47	

questionnaires presented to the patients in the different follow-up groups.

Measurements

At initial enrollment, demographics were recorded and subjects completed the questionnaires. The short version of the Disabilities of the Arm, Shoulder, and Hand questionnaire (QuickDASH) was used to measure disability (scores between 0–100, where higher scores represent more disability). Additionally, patients were asked to complete the short version of the Patient Health Questionnaire (PHQ-2) to measure depressive symptoms and the Pain Self-Efficacy Questionnaire (PSEQ) to measure the patient's sense that they can accomplish their goals in spite of pain. Furthermore, subjects rated their pain on an 11-point ordinal scale from 0 (no pain) to 10 (worst pain ever). At follow-up, patients were asked to complete the QuickDASH, PHQ-2, PSEQ, and 11-point ordinal measures of pain intensity and satisfaction with the visit to the hand surgeon.

Statistical Analysis

An a priori sample size calculation with a Chi-square test determined that 143 patients were needed to provide 80 % power with alpha 0.05 to detect a medium effect size ($d=0.3$) difference in response rate between the three follow-up methods. We accounted for 5 % incomplete data and enrolled 150 (50 patients per group) patients.

Statistical significance of the difference in follow-up rate between the three follow-up methods (mail, e-mail, or phone) was assessed using the chi-square test. Statistical significance of the differences in other discrete variables was determined

using chi-square test or Fisher's exact test, if applicable. Differences in continuous variables between the three follow-up groups were assessed with one-way ANOVA or Kruskal-Wallis if the variable was nonparametric. Differences in continuous variables between responders and nonresponders were determined with Student's *t* test or the Mann-Whitney *U* (nonparametric) test. Variables with a *P* value less than 0.10 in bivariate analysis were entered in multivariable logistic regression analysis.

Results

Patients

The patients had a mean age of 49 ± 17 years (range 19 to 92 years). The slight majority of the sample consisted of women (52 %). One hundred patients were established patients in our practice being seen in regular follow-up (67 %), and 50 patients were new patients to our practice (33 %). Of the 150 patients enrolled in the study, 69 (46 %) responded to our request for follow-up by any method at 3 months (Table 1).

Bivariate Analysis

Each follow-up group (mail, e-mail, and phone) included 50 patients. The response rate was 34 % (17 patients) in the mail group, 24 % (12 patients) in the e-mail group, and 80 % (40 patients) in the phone group, these differences were significant ($P<0.001$) (Tables 2 and 3). Patients responding to follow-up ($n=69$) were significantly older than nonresponders (53 vs. 46, $P=0.0046$) (Table 1). Significantly, more patients smoked

Table 3 Difference in the response rate of each response group

Parameter	Cohort <i>n</i> =150		Phone <i>n</i> =50		Mail <i>n</i> =50		E-mail <i>n</i> =50	
	Number	%	Number	%	Number	%	Number	%
Responder								
Yes	69	46	40	80	17	34	12	24
No	81	54	10	20	33	66	38	76

Table 4 Patients not responding to follow-up who were experiencing significantly more pain at the time of enrollment

Responders <i>n</i> =69	Phone <i>n</i> =40		Mail <i>n</i> =17		E-mail <i>n</i> =12		<i>P</i> value
	Mean	SD	Mean	SD	Mean	SD	
Parameter							
Age	51	18	53	16	60	14	0.15
Education	16	2.7	16	2.5	16	1.9	0.44
Pain	3.8	2.9	3.1	2.8	2.5	2.9	0.34
Pain (at follow-up)	2.4	2.7	1.5	2.0	1.6	2.3	0.59
QuickDASH	31	21	29	23	21	17	0.29
QuickDASH (at follow-up)	19	23	15	18	18	20	0.70
PHQ-2	0.60	1.1	1.0	1.7	0.17	0.58	0.41
PSEQ	49	13	51	9.1	54	6.4	0.26
Satisfaction with condition (at follow-up)	7.7	2.4	8.1	2.4	7.6	2.4	0.65
Satisfaction with treatment (at follow-up)	7.9	2.9	9.2	1.2	8.2	3.3	0.53
Overall health	8.2	1.5	7.8	2.3	8.1	1.9	0.94
	Number	%	Number	%	Number	%	
Gender							
Male	20	50	11	65	5	42	0.43
Female	20	50	6	35	7	58	
Type of visit							
New	17	43	4	24	4	33	0.40
Follow-up	23	58	13	76	8	67	
Sought treatment for condition before							
Yes	11	28	5	29	2	17	0.81
No	29	73	12	71	10	83	
Other pain condition							
Yes	19	48	5	29	0	0	0.0040
No	21	53	12	71	12	100	
Prior surgery							
Yes	6	15	2	12	2	17	0.99
No	34	85	15	88	10	83	
Marital status							
Single	13	33	7	41	2	17	0.73
Living with partner	1	2.5	0	0	0	0	
Married	19	48	9	53	8	67	
Separated/Divorced	5	13	0	0	1	8.3	
Widowed	2	5.0	1	5.9	1	8.3	
Working status							
Full-time	21	53	10	59	4	33	0.50
Part-time	4	10	1	5.9	1	8.3	
Homemaker	0	0	0	0	0	0	
Retired	7	18	3	18	7	58	
Unemployed, able to work	2	5	1	5.9	0	0	
Unemployed, not able to work	4	10	1	5.9	0	0	
On worker's compensation	0	0	0	0	0	0	
Currently on sick leave	2	5	1	5.9	0	0	
Smoking							
Yes	3	7.5	0	0	0	0	0.75
No	37	93	17	100	12	100	

in the nonresponder group ($P=0.018$). There was a significant difference in work status between responders and nonresponders: there were significantly less patients working full-

time in the group of responders ($P=0.041$). There was no significant difference between the other demographics (education, gender, type of visit, sought treatment before, prior

Table 5 Differences between the three follow-up groups

Nonresponders <i>n</i> =81		Phone <i>n</i> =10		Mail <i>n</i> =33		E-mail <i>n</i> =38		<i>P</i> value
Parameter		Mean	SD	Mean	SD	Mean	SD	
Age		42	16	50	18	43	15	0.28
Education		16	2.8	15	2.5	16	2.3	0.66
Pain		4.3	2.8	4.2	2.4	4.9	2.8	0.47
QuickDASH		26	23	32	18	37	24	0.38
PHQ-2		0.30	0.48	0.33	0.65	0.68	1.5	0.98
PSEQ		53	7.5	49	10	49	12	0.38
Gender		Number	%	Number	%	Number	%	
	Male	3	30	16	48	17	45	0.64
	Female	7	70	17	52	21	55	
Type of visit								
New patient		5	50	11	33	9	24	0.26
Follow-up		5	50	22	67	29	76	
Sought treatment								
Yes		5	50	9	27	16	42	0.29
No		5	50	24	73	22	58	
Other pain condition								
Yes		1	10	9	27	24	63	0.25
No		9	90	24	73	14	37	
Prior surgery								
Yes		1	10	5	15	3	7.9	0.70
No		9	90	28	85	35	92	
Marital status								
Single		6	60	11	33	18	47	0.76
Living with partner		0	0	0	0	1	2.6	
Married		3	30	15	45	14	37	
Separated/divorced		1	10	4	12	4	11	
Widowed		0	0	3	9.1	1	2.6	
Work status								
Full-time		10	100	21	64	27	71	0.94
Part-time		0	0	1	3.0	3	7.9	
Homemaker		0	0	1	3.0	0	0	
Retired		0	0	4	12	3	7.9	
Unemployed, able to work		0	0	1	3.0	0	0	
Unemployed, not able to work		0	0	2	6.1	3	7.9	
On worker's compensation		0	0	1	3.0	1	2.6	
Currently on sick leave		0	0	2	6.1	1	2.6	
Smoking								
Yes		4	40	6	18	4	11	0.090
No		6	60	27	82	34	89	

surgery, marital status) between responders and nonresponders (Table 1).

Patients not responding to follow-up were experiencing significantly more pain at the time of enrollment ($P=0.0079$) (Tables 4, 5, and 6). Disability, depression, and pain self-efficacy were not significantly different between responders and nonresponders (Table 6). In the group of patients who were approached by e-mail and responded to follow-up, none of the patients reported other pain conditions ($P=0.0040$)

(Table 4). There were no other significant differences between the three follow-up groups (Tables 4 and 5).

Multivariable Analysis

Working status, age, smoking, pain intensity, and the type of follow-up were entered in a logistic regression model looking at predicting factors for responding to follow-up. Working full-time (OR 0.26; CI 0.11–0.64; $P=0.0030$) was associated

Table 6 Disability, depression, and pain between responders and nonresponders

Parameter	Responders <i>n</i> =69		Nonresponders <i>n</i> =81		<i>P</i> value
	Mean	SD	Mean	SD	
QuickDASH	29	22	34	21	0.16
PHQ-2	0.62	1.2	0.49	1.1	0.56
PSEQ	50	11	49	11	0.53
Pain	3.4	2.7	4.6	2.7	0.0079

with no response. Nonsmoking (OR 9.1; CI 1.9–45; $P=0.0060$), lower pain intensity (OR 1.2; CI 1.0–1.4; $P=0.021$), and follow-up by phone (OR 18; CI 6.3–51; $P<0.001$) were associated with responding to follow-up.

Discussion

We were able to reject the primary null hypothesis by demonstrating a difference in response rate between follow-up by mail, e-mail, or phone. We found that 80 % of patients approached by phone responded (OR 18) to follow-up. Response rates of follow-up by mail or e-mail were 34 and 24 %, respectively. Factors associated with responding to follow-up were nonsmoking (OR 9.1) and lower pain intensity (OR 1.2). Working full-time was associated with nonresponding to follow-up (OR 0.26).

These results should be viewed in light of the limitations of this study. First, patients assigned to follow-up by either mail or e-mail were sent a letter or e-mail once, whereas patients assigned to follow-up by phone were approached until the patient responded, with a maximum of three attempts. Since we excluded patients with limited or no internet access, the actual response rate might even be lower in a random patient selection. In the phone group, we decided to use multiple attempts, thereby taking into account that a phone call can be missed (in contrast to a letter or e-mail). The number of attempts could have influenced the large response rate observed in the phone follow-up group; however, 42 % of patients responded after only a single attempt. The response rate after only a single attempt still exceeds that of either the e-mail or the mail group. We did not send out (multiple) reminder e-mails to adjust for the possibility of patients losing track of e-mails in the modern high-frequency e-mail traffic. It is possible repeat e-mails would have increased the response rate in this group. The response rate for follow-up by mail is consistent with the percentages in other studies [1, 8, 9]. The higher response rate for follow-up by phone is in line with earlier research [11]. Different response rates in literature could be present due to different study design [3, 7]. Rhee

et al. [11] assigned emergency department patients to either follow-up by phone or mail and reported response rates of 41 and 20 %, respectively. The results of our study might vary with the number of questionnaires that patients are asked to complete. Second, this study is performed in subjects with various diagnoses presenting to an orthopedic hand service. A study in a different population (e.g., just one discrete diagnosis or in a different medical field) might result in different findings. Despite this possible variation, previous research found comparable response rates between patients with different diagnoses and in other medical specialties [11].

Earlier studies reported that younger age, male sex, more pain, working status, marital status, and smoking were associated with not responding to follow-up [1, 2, 5, 10, 12]. Apart from gender and marital status, we found the same predictors of nonresponse to follow-up. Of note however; in multivariable analysis, we found that age is not an independent predictor of responding. Working full-time is associated with nonresponding, which could be explained by the shortage of time and other priorities.

The increased use of the internet in recent decades might imply that follow-up by e-mail could result in higher response rates. On the contrary, this study found higher response rates in patients approached for follow-up by phone. Future studies using questionnaires for the long-term evaluation of patients could consider using follow-up by phone, to maximize response rate. The results of this investigation suggest that future studies designed using questionnaires for short-term evaluation can maximize their response rate using a phone follow-up method. It is not known if this holds true for periods of follow-up longer than 3 months. However, follow-up by phone is potentially more time consuming and costly.

Furthermore, if studies are performed in populations associated with nonresponding (e.g., younger age, male gender, smoking, working full-time), low response rates should be taken into account. Since follow-up by e-mail is an easy, cheap, and environmentally friendly follow-up method, future studies about the response rates of e-mail could consider using reminders to improve response rates. Lastly, it could be beneficial to study if the quantity, extent, and content of the questionnaires (e.g., questionnaires with less personal information) influences the follow-up rate.

Conflict of interest Sjoerd P. F.T. Nota declares that he has no conflict of interest related to this work.

Joost A. Strooker declares that he has no conflict of interest related to this work.

David Ring declares that he has no conflict of interest related to this work.

Statement of human and animal rights All procedures followed were in accordance with the ethical standards of the responsible committee on

human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008 (5).

Statement of informed consent Informed consent was obtained from all patients for being included in the study.

References

1. Bot AGJ, Anderson JA, Neuhaus V, Ring D. Factors associated with survey response in hand surgery research. *Clin Orthop Relat Res*. 2013;471(10):3237–42. doi:[10.1007/s11999-013-3126-0](https://doi.org/10.1007/s11999-013-3126-0).
2. Dallosso HM, Matthews RJ, McGrother CW, Clarke M, Perry SI, Shaw C, et al. An investigation into nonresponse bias in a postal survey on urinary symptoms. *BJU International* Blackwell Publishing Ltd. 2003;91(7):631–6. doi:[10.1046/j.1464-410X.2003.04172.x](https://doi.org/10.1046/j.1464-410X.2003.04172.x).
3. Erhart M, Wetzel RM, Krügel A, Ravens-Sieberer U. Effects of phone versus mail survey methods on the measurement of health-related quality of life and emotional and behavioural problems in adolescents. *BMC Public Health* BioMed Central Ltd. 2009;9(1):491. doi:[10.1186/1471-2458-9-491](https://doi.org/10.1186/1471-2458-9-491).
4. Hwang RW, Ring D. Pain and disability related to osteoarthritis of the trapeziometacarpal joint. *J Hand Microsurg* Springer-Verlag. 2011;3(2):63–5. doi:[10.1007/s12593-011-0047-6](https://doi.org/10.1007/s12593-011-0047-6).
5. Jacobsen BK, Thelle DS. The Tromsø Heart Study: responders and non-responders to a health questionnaire, do they differ? *Scand J Public Health*. 1988;16(2):101–4. doi:[10.1177/140349488801600207](https://doi.org/10.1177/140349488801600207).
6. Kim J, Lonner JH, Nelson CL, Lotke PA. Response bias: effect on outcomes evaluation by mail surveys after total knee arthroplasty. *J Bone Joint Surg*. 2004;86(1):15–21.
7. Lannin NA, Anderson C, Lim J, Paice K, Price C, Faux S, et al. Telephone follow-up was more expensive but more efficient than postal in a national stroke registry. *J Clin Epidemiol*. 2013;66(8):896–902. doi:[10.1016/j.jclinepi.2013.03.005](https://doi.org/10.1016/j.jclinepi.2013.03.005).
8. Lozano Calderón SA, Paiva A, Ring D. Patient satisfaction after open carpal tunnel release correlates with depression. *J Hand Surg*. 2008;33(3):303–7. doi:[10.1016/j.jhsa.2007.11.025](https://doi.org/10.1016/j.jhsa.2007.11.025).
9. Lozano Calderón SA, Souer JS, Jupiter JB, Ring D. Psychological differences between patients that elect operative or nonoperative treatment for trapeziometacarpal joint arthrosis. *HAND* Springer-Verlag. 2008;3(3):271–5. doi:[10.1007/s11552-008-9098-y](https://doi.org/10.1007/s11552-008-9098-y).
10. Macera CA, Jackson KL, Davis DR. Patterns of non-response to a mail survey. *J Clin Epidemiol*. 1990. doi:[10.1016/0895-4356\(90\)90112-3](https://doi.org/10.1016/0895-4356(90)90112-3).
11. Rhee KJ, Allen RA, Bird J. Telephone vs mail response to an emergency department patient satisfaction survey. *Acad Emerg Med*. 1998. doi:[10.1111/j.1553-2712.1998.tb02676.x](https://doi.org/10.1111/j.1553-2712.1998.tb02676.x).
12. Solberg TKT, Sørli AA, Sjaavik KK, Nygaard ØPØ, Ingebrigtsen TT. Would loss to follow-up bias the outcome evaluation of patients operated for degenerative disorders of the lumbar spine? *Acta Orthop*. 2011;82(1):56–63. doi:[10.3109/17453674.2010.548024](https://doi.org/10.3109/17453674.2010.548024).