Journal of Clinical Epidemiology 115 (2019) 150−159

ORIGINAL ARTICLE

Contacting authors by telephone increased response proportions compared with emailing: results of a randomized study

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Accepted 23 May 2019; Published online 29 May 2019

Abstract

Objective: The aim of the study was to compare response proportions and research costs of telephone calling vs. continued emailing nonresponding authors of studies included in a systematic review.

Study Design and Setting: Key features of included studies were poorly reported in a systematic review of diabetes quality improvement interventions. We developed a survey to request additional information from contact authors. After three email contact attempts, only 76 of 279 authors (27%) had completed the survey. In this study, we randomly assigned nonresponding authors to contact by telephone calling vs. continued emailing to compare the effect of these strategies on response proportions and research costs.

Results: We randomized 87 authors to telephone and 89 to email contact. Telephone contact increased survey completion (36.7% vs. 20.2%; adjusted risk difference of 15.6% [95% confidence interval: 2.90%, 28.4%]; adjusted odds ratio 2.26 [95% confidence interval: 1.10, 4.76]) but required more time to deliver (20 vs. 10 hours in total; 14 vs. 7 minutes per randomized author; 26 vs. 4 weeks), and cost more (total intervention cost of $504 Canadian dollars vs. $252 for the telephone and email arm, respectively).

Conclusion: Contacting nonresponding authors of included studies by telephone increased response compared with emailing but required more investigator time and had higher cost.

Keywords: Contacting authors; Randomized controlled trial; Systematic review methodology; Telephone contact; Email contact; Study Within A review

1. Introduction

Publications of primary research studies often do not report enough information about the study methods and results to allow systematic reviewers to assess the evidence in the studies [1,2]. To address incomplete reporting, reviewers can attempt to contact study authors to obtain additional information, for example, about study characteristics

Funding: This study is supported by a grant from the Canadian Institutes of Health Research (CIHR, FRN-123345) and a research fellowship held by K.J.D. (Frederick Banting and Charles Best Canada Graduate Scholarship; GSD-134936). N.M.I. is funded by a New Investigator Award from the Canadian Institutes of Health Research and a Clinician Scientist Award from the Department of Family and Community Medicine at the University of Toronto. J.M.G. holds a Canada Research Chair in Health Knowledge Transfer and Uptake and is funded by a Foundation Grant from the Canadian Institutes of Health Research. D.M. is supported by a University Research Chair. Funders played no role in the design, conduct, or reporting of the study.

Conflict of interests: The authors have no conflicts of interest.

Ethical approval: This study was approved by the Ottawa Health Science Network Research Ethics Board (Protocol ID: 20180429-01H).

Registration: The trial is registered on the SWAR repository; Registration number SWAR11 (https://www.qub.ac.uk/sites/TheNorthernIrelandNetworkforTrialsMethodologyResearch/SWATSWARInformation/Repositories/SWARStore/)

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https://doi.org/10.1016/j.jclinepi.2019.05.027

What is new?

Key findings

- Contacting nonresponding authors for additional information by telephone improved response proportions compared with repeat emailing but required more investigator time and had higher cost.

What this adds to what was known?

- This is the first RCT to compare the effect of telephone calling vs. repeat emailing to authors of studies included in a systematic reviews who have not responded to initial email requests for information.

What is the implication and what should change now?

- Future studies should compare calling all authors upfront vs. the approach evaluated in this study (calling authors who failed to respond to previous email attempts).

[3], research methods [4], or outcomes [3–5]. Incomplete reporting may be even more problematic in studies of complex interventions where consensus on intervention terminology is lacking [6], descriptions of interventions are often incomplete [7,8], and variation in components, as well as the interactions between components and study characteristics influence treatment effects [9,10].

Existing guidance on the conduct of systematic reviews recommends contacting authors to obtain additional information [3–5], but the evidence supporting the effectiveness of contacting authors is limited [1,4,11]. Five comparative studies identified in a Cochrane review of methods for obtaining unpublished data suggest that authors are more likely to respond to requests for additional information if they pertain to a clarification of study methods (vs. study results), are received by email (vs. letter or fax), and refer to more recently published studies [12]. However, the quality of the five studies identified by the review was poor—only two studies randomly assigned authors to different methods of contact and only one of the three nonrandomized comparative studies had been published in full text [12]. Furthermore, only two studies considered the time and monetary cost associated with conducting author contact [13,14]. One nonrandomized study assessed time for author response in days (but not investigator time) [13], and another nonrandomized study assessed the cost of intervention delivery, but only for study materials (i.e., postage and paper) [14].

In a recent update of our review of diabetes quality improvement (QI) interventions [15,16], we found that the included primary studies often provided incomplete information about intervention components, populations, and settings [16,17]. In preparing to update the review again, the review team (including the methodologists, clinicians, and knowledge users listed in Appendix A) developed a tailored survey to request additional information from the contact authors of all included studies (n = 279) [18]. We sent the Web-based survey once a week via email to corresponding authors until they responded, requested not to be contacted further, or we completed a maximum of three contact attempts. Emails to contact authors were sent from the email address of a senior investigator on our research team (J.M.G.). We provided a financial incentive: authors who completed the survey were entered in a draw for one of five $100 (CAD) gift certificates. A total of 76 authors (27.2%) had completed the survey after three email attempts. In a single occasion, speaking to a primary study author by telephone (to address survey troubleshooting issues) led to a positive interaction and subsequent survey completion. Based on this observation, we hypothesized that attempting to contact nonresponding authors by telephone would increase rates of survey completion compared with continued emailing (i.e., for a fourth time). Given the paucity of evidence about the preferred methods for author contact and the likely higher costs of telephone contact, we decided to evaluate this hypothesis in a randomized trial.

2. Methods

2.1. Design

We used a parallel group randomized controlled trial design with study contact author as the unit of randomization, intervention delivery, and analysis. We followed a prespecified protocol and registered the study on the Study Within A Review (SWAR) repository [19] (registration number SWAR11). We report our methods and results in accordance with the CONSORT 2010 statement (Appendix B) [20].

2.2. Sample

We included authors in our trial if they had published a study included in the update of the diabetes QI review, had not completed the survey, and had not asked to be removed from further contact. We linked different studies (and their respective surveys) by the same author to ensure that only unique authors were randomized. Of the 279 authors initially contacted, 76 completed the survey, and five asked to be removed from further contact for varying reasons (e.g., retirement, no time, and old study). We removed the author of a study who did not meet the eligibility criteria of the QI review, and we linked 39 surveys to 17 unique authors, leaving a total of 175 unique authors (representing 197 surveys) to be randomized. After randomizing 175 authors, we identified one additional author

who had also not completed the survey. The author was randomized, resulting in a final total of 176 randomized authors.

2.3. Randomization

We randomly assigned authors in 1:1 ratio to the telephone or email intervention group. Because we expected that year of publication would be an important predictor of author response [12,21], we stratified the randomization by last year of study conduct (or year of study publication, when the last year of study conduct was not reported) using the following strata: 1980−1989 (n = 2); 1990−1999 (n = 23); 2000−2009 (n = 97); and 2010−2014 (n = 53). For authors with more than one study, we used the publication year of the authors' most recent study to define their stratum. We generated the random allocation sequence in R [22]. The investigator responsible for randomization (K.J.D.) masked all author and study details before randomization and preserved the masking until allocation had occurred, and we were ready to begin the delivery of the interventions. Postrandomization, we excluded two authors that had completed the survey during our initial contacts and were randomized in error (one in each group).

2.4. Intervention

2.4.1. Telephone contact

Contacting authors by telephone involved three key phases: searching for authors' phone numbers, calling authors up to three times by telephone to request that they complete the online survey, and following up with consenting authors via email with the survey link and study PDF. We report additional details on the telephone contact intervention in Appendix C). The objective of contacting authors by telephone was to speak directly to nonrespondents to promote completion of the survey and offer assistance with the survey platform, if needed.

2.4.2. Email contact

We sent authors in the group assigned to continued emailing with up to three additional email requests (one request per week) to complete the survey. Emails included the survey link and study PDF; authors with multiple studies were sent the unique survey links and PDFs for all their respective studies. The email noted the deadline to complete the survey (3 weeks from the date the email was sent).

An overview of the interventions for the telephone and email groups is presented in Figure 1. We compare the interventions in Appendix D.

2.4.3. Delivery of interventions

One unblinded investigator (K.J.D.) delivered the interventions, managed data, and performed the analysis. Primary study authors were blinded to the intervention, as they were unaware of the trial comparing different methods of author contact. Most author contact was attempted from the Ottawa Hospital Research Institute in Ottawa, Canada; one author was called offsite outside of research hours to accommodate a 13-hour time difference.

2.5. Ethics review

We conceptualized our trial as a SWAR, that is, a study undertaken alongside a systematic review to generate evidence on methods to guide future systematic reviews [23]. We judged the risk of our interventions to be minimal and the potential for consent to influence findings to be substantial. We therefore sought a waiver of consent. We obtained approval from the Ottawa Health Science Network Research Ethics Board to waive consent and perform a debrief with trial participants following trial completion (Protocol ID: 20180429-01H).

2.6. Outcomes

The primary outcome was the response proportion, defined as the number of authors who completed the survey divided by the total number of authors assigned to the intervention. As the primary outcome was binary and clustering of studies for each author was accounted for at the design phase of the trial, unique authors were counted only once regardless of the number of surveys submitted. The secondary outcomes of the study were the time to deliver the interventions and associated costs. We measured time using an online timer and rounded to the nearest minute. If time was measured as $<$1 minute, we rounded up; this occurred in searching for some author phone numbers that were found immediately or when we telephoned an author and the call rang but was not answered by a person or voicemail. We calculated the total intervention cost by multiplying observed time to deliver each intervention by the salary range of a research assistant position that typically contacts authors during the review process. The salary range (CAD $23.14−$27.26 per hour) was based on 2017 values at the Ottawa Hospital Research Institute. We calculated the cost per completed survey as the total intervention cost divided by the number of completed surveys in that intervention group. Post hoc, we calculated the time taken by authors to complete the survey by summing the individual author's access times (obtained using the time stamps for accessing the survey pages). Of note, this approach may have overestimated the time authors spent completing the survey in some cases because it assumed authors were completing the survey the entire time the survey Web pages were open in their browsers.

2.7. Statistical analysis

We first estimated the effect of telephone and email contact on response proportions in each arm. We then compared the odds of completing the survey in the

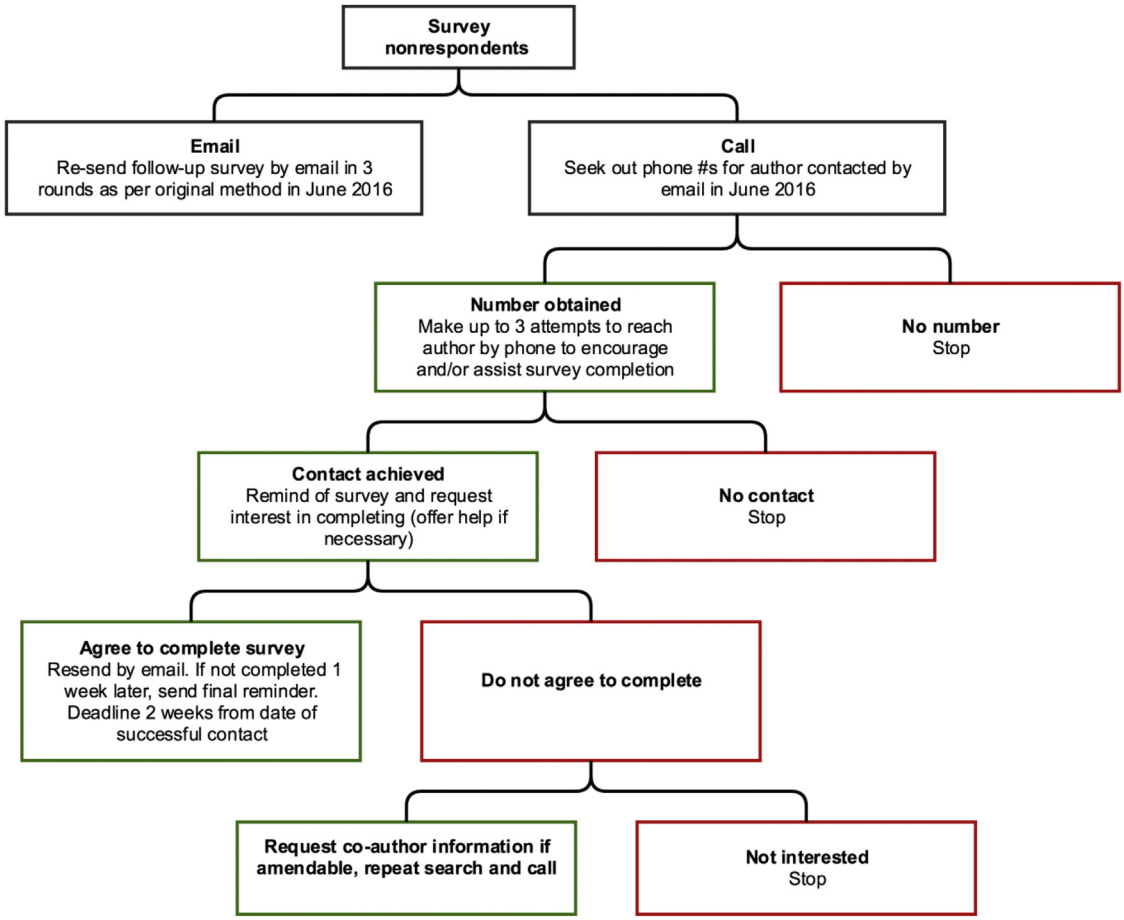

Fig. 1. Flow diagram of the randomized controlled trial.

telephone group using exact logistic regression [24], with stratification by decade [25,26]. The sample size of this trial was not under our control because the number of nonresponding authors among all authors of studies included in the diabetes QI review was not under our control. Nevertheless, *before* undertaking the trial, for the sample size available, we calculated the power to detect a difference in response proportions for different magnitudes of difference using a two-sided chi-square test for two proportions at the 0.05 alpha level (Appendix E). For example, we calculated that if the email intervention led to a 10% response proportion and the telephone intervention led to an additional response proportion between 15 and 20%, our study's power to detect the difference would range between 0.75 and 0.92.

3. Results

3.1. Author contact flow diagram

We present a flow diagram of the author contact process in Figure 2 (a more detailed flow diagram is presented in Appendix F) and summarize authors' characteristics in Table 1. We assigned 87 authors to the telephone group and 89 to the email group. We report results of the telephone and email groups in Tables 2 and 3 and Figure 3.

3.2. Telephone contact

We delivered the telephone intervention between October 14, 2016, and April 13, 2017. We were unable to obtain phone numbers for 11 of the 87 authors randomized to the telephone group. Of these, we were able to find a phone number for a coauthor in nine cases. We stopped attempts to contact two authors of older articles by telephone contact because we could not find a phone number for the randomized author or another coauthor on the article. When available, we used the phone number of the authors' office. For many authors however, we could not retrieve this phone number, and we used numbers related to the affiliation of the authors (e.g., academic department, clinical unit, and company switchboard). The time difference for authors from Eastern Standard Time ranged from −6 hours (Honolulu, Hawaii) to +16 hours (Melbourne, Australia).

Of the 84 authors called once, 16 completed the survey, and 10 were stopped from further contact, leaving 58

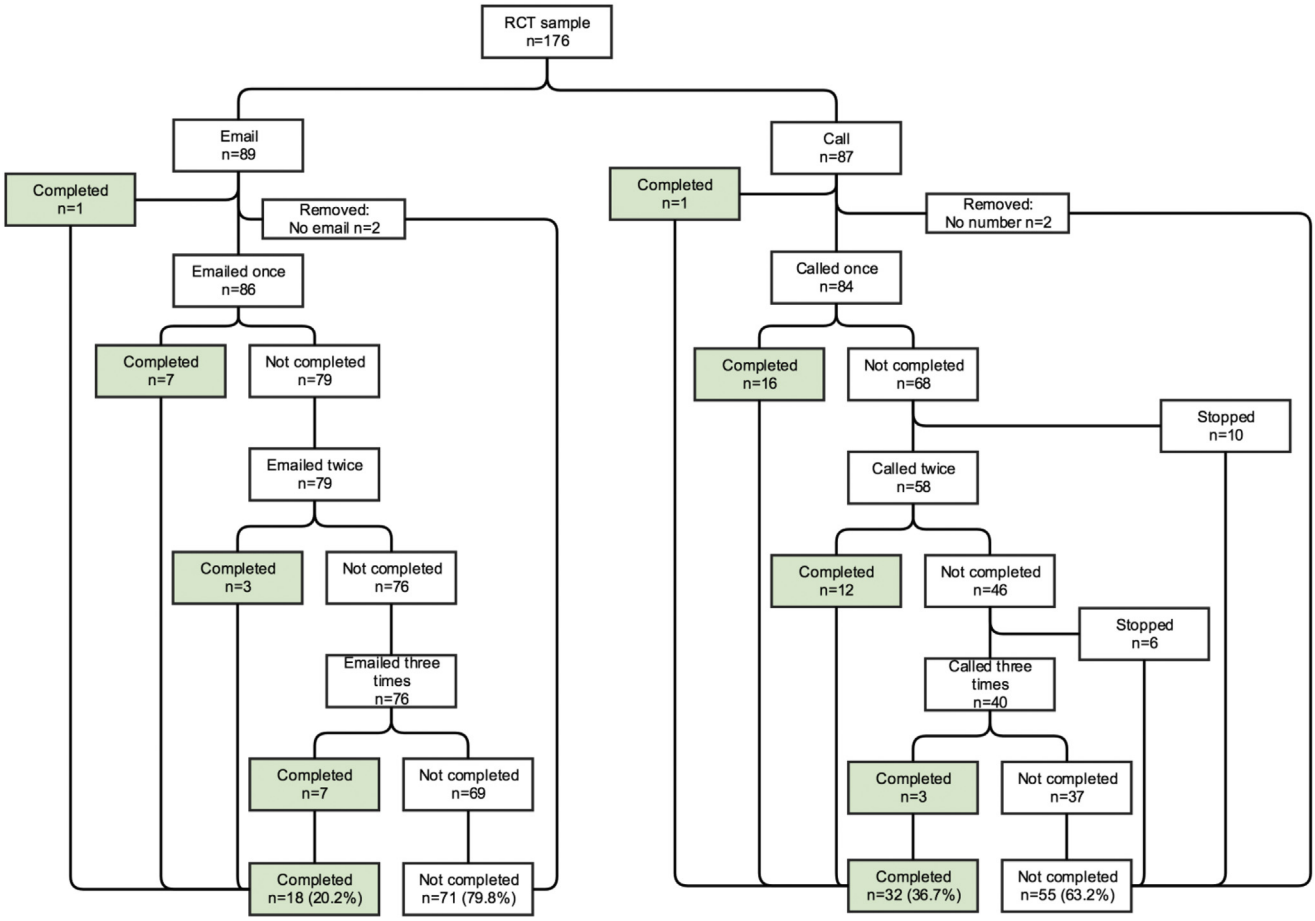

Fig. 2. Overview of email and call interventions.

Table 1. Authors' characteristics

Characteristics	Telephone contact (n = 87)	Email contact (n = 89)	Total (n = 176)
No. of authors[a]			
1980–1989	1	1	2
1990–1999	11	13	24
2000–2009	49	48	97
2010–2014	26	27	53
Duplicate authors			
No. of authors with >1 study	8	9	17
No. of studies	18	21	39
Region[b]			
United States	40	39	79
Canada	3	7	10
South America	1	0	1
Europe	28	28	56
Asia	9	9	18
Africa	0	2	2
Australia and Oceania	6	4	10

[a] Authors were stratified on decade stratum during randomization.

[b] Based on information available in the source publications. If author had multiple publications, information from most recent article (used for randomization in stratification) was used.

Table 2. Results of contact by telephone vs. email on survey completion

Results	Telephone contact (n = 87)	Email contact (n = 89)
No. of authors no contact attempts made		
Completed pre-RCT	1	1
No contact information found	2	2
No. of attempts (telephone or email)		
Attempt 1	84	86
Attempt 2	58	79
Attempt 3	40	76
Total	182	241
No. of completed (response proportion)		
Pre-RCT[a]	1 (NA)	1 (NA)
Post attempt 1[b]	16 (19.0%)	7 (8.1%)
Post attempt 2[b]	12 (20.7%)	3 (3.8%)
Post attempt 3[b]	3 (7.5%)	7 (9.2%)
Total[c]	32 (36.8%)[d]	18 (20.2%)
No. of completed (N strata)		
1980–1989	0 (1)	0 (1)
1990–1999	2 (11)	3 (13)
2000–2009	23 (49)	8 (48)
2010–2014	7 (26)	7 (27)
Total time to deliver intervention (min)[e]		
Attempt 1	511 (6 min/attempt)	351 (4 min/attempt)
Attempt 2	452 (8 min/attempt)	162 (2 min/attempt)
Attempt 3	238 (6 min/attempt)	88 (1 min/attempt)
Intervention total	1,201 (7 min/attempt)	601 (2 min/attempt)
Intervention total/number completed	38	33
Total cost to deliver intervention ($ lower to $ upper)		
Attempt 1	$197–$232	$135–$159
Attempt 2	$174–$205	$62–$74
Attempt 3	$92–$108	$34–$40
Intervention total	$463–$546	$232–$273
Intervention total/completed	$15–$17	$13–$15
Time to complete survey by authors (min)		
Mean (SD)	87 (165)	44 (38)
Median (minimum to maximum)	29 (8–901)	32 (14–166)

Abbreviations: NA, not applicable; RCT, randomized controlled trial; SD, standard deviation.

[a] Two surveys (one in each arm) were completed before delivery of the call and email interventions.

[b] n completed/N attempted contact by telephone or email.

[c] n completed/N randomized contact by telephone or email.

[d] Adjusted odds ratio in favor of the telephone intervention, adjusted for strata groups: OR 2.26 (95% confidence interval: 1.10, 4.76).

[e] Time to deliver intervention includes time to search, call and, email for telephone intervention and time to prepare, send, and manage flow of emails for the email intervention.

authors to be called twice. In general, we stopped attempting to contact authors when contact with phone numbers was unsuccessful, and no further contact information for the author or any other coauthor could be found, or if an author (or their assistant) indicated that they were too busy. Of the 58 authors who we called twice, 12 completed the survey, and six were stopped from further contact, leaving 40 to be called a third and final time. Of the 40 authors called three times, three authors completed the survey. Overall, there were 10 changes in authors (i.e., to coauthors) and 16 changes in phone numbers; contact changes were the result of either additional searches (when calls failed) or information provided by authors (e.g., of a more suitable coauthor to contact). In total, 32 authors in the telephone contact group completed the survey (31 during the intervention and one prerandomization; 32 of 87 [36.7%] after 182 calls). The telephone intervention took a total of 20 hours (1,201 minutes) to deliver (6.60 minutes per call), including the time to search for numbers and email the survey (Table 3). The estimated total cost to

Table 3. Details on time (minutes) to deliver telephone and email interventions

	Telephone contact (n = 87)				Email contact (n = 89)				
Attempt	Search	Call	Email	Total[a]	Prepare	Send	Failed	Response flow	Total[a]
1	450	222	148	820	240	48	63	0	351
2	42	140	57	239	20	125	0	17	162
3	19	90	33	142	0	88	0	0	88
Total	511	452	238	1201	260	261	63	17	601

[a] Total time to deliver attempt n = 1, 2, 3 (e.g., for attempt 1 in telephone contact, total time was calculated by summing the time taken to search, contact, and email during attempt 1).

deliver the telephone intervention ranged between $463 and $546 ($15–$18 per completed survey). Authors in the telephone contact group spent a median of 28 minutes (range 8–901 minutes) completing the survey. The high upper range in observed time to complete surveys in the telephone group is likely due to a loaded survey being left open on a Web browser; if the extreme outlier of 901 minutes was removed, the range was 8-389. Additional details on protocol violations and implementation challenges are documented and are available on request.

3.3. Email contact

We delivered the email intervention between October 25 and November 10, 2016. We stopped attempts to contact two authors of older articles because we could not find an email for the randomized author or another coauthor on the article. We emailed 86 authors once; 81 emails went through, and five failed. We found new emails for the same author in all five cases of failed emails and re-sent the first email to these authors. Of these 86 authors emailed once, seven completed the survey, leaving 79 authors to be sent a second email. Of the 79 authors emailed twice, three authors completed the survey, leaving 76 authors to be sent a final email reminder. Finally, of the 76 authors emailed a third time, seven authors completed the survey. In total, 18 authors in the email contact group completed the survey (17 during the intervention and one prerandomization; 18 of 89 [20.2%]) after 241 emails. The email intervention took a total of 10 hours (601 minutes) to deliver (2.49 minutes per email). The estimated total cost to deliver the email intervention ranged between $232 and $273 ($13–$15 per completed survey). Authors in the email group spent a median of 32 minutes (range 14–166 minutes) completing the survey.

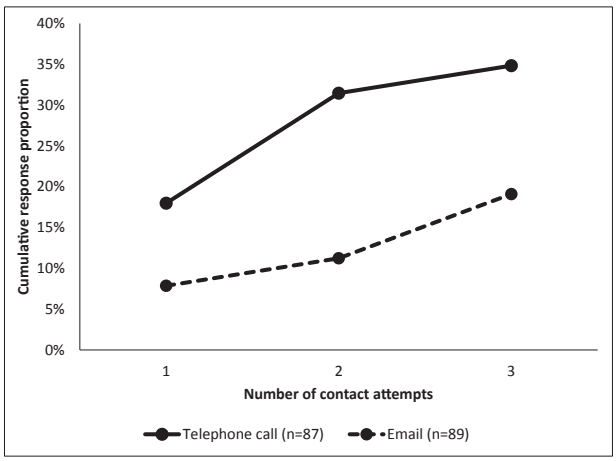

Fig. 3. Cumulative response proportion of telephone and email contact.

3.4. Comparison of telephone and email contact

Based on observed response proportions of 36.7% for the telephone contact group and 20.2% for the email contact group (adjusted risk difference of 15.6% [95% confidence interval: 2.90%, 28.4%], contacting authors by telephone significantly improved the odds of authors completing the survey (adjusted odds ratio of 2.26 [95% confidence interval: 1.10, 4.76]), but took more time to deliver (20 hours in total vs. 10 hours) and had higher cost (average total cost $504 vs. $252). In a post-hoc analysis of author response by region, country of publication did not appear to modify the effect of the intervention on response to the survey (Appendix G).

4. Discussion

Incomplete reporting of primary study methods and results poses substantial challenges for systematic reviewers. Although reviewers often attempt to contact authors to obtain additional information, evidence to inform the choice of one author contact strategy over another is limited. We sought to compare the effectiveness of telephone calling versus repeat emailing on author response and associated research costs in a parallel group trial of authors whose studies had been included in the update of the diabetes QI review who had not responded to previous email requests for additional information. We found that authors randomized to contact by telephone were significantly more likely to respond to our request for additional information compared with those randomized to contact by email, lending support to our hypothesis that direct communication between reviewers and study authors improves response. Calling authors, however, required more investigator time and was associated with higher cost. To our knowledge, this is the first study to empirically compare

the effectiveness of telephone vs. continued emailing of nonresponding authors.

The response proportions (20.2% in the email group and 36.7% in the telephone group) in our trial are similar with those observed in related work [13,21]. One nonrandomized comparative study compared author contact by letter, email, or both found a 47% response proportion among authors contacted by email alone [13]. Unlike our study however, the calculation of response proportion excluded over one-third of the authors with no contact information ($n = 95$). In another single arm study, investigators achieved a 38% response proportion by contacting authors using a mixed modes approach (three contact attempts by email, one attempt by phone, and one final attempt by email) [21]. The response proportion in that study was consistent with findings from our telephone group and supported evidence from survey literature on the added value of using multiple contact modalities for survey nonresponders compared with continued use of a single modality [27].

Although contacting authors by telephone increased the response proportion compared with email, we found implementation of the telephone intervention took substantially longer and was more difficult to standardize. First, searching for phone numbers often took a long time and was not always straightforward. Our protocol did not define an upper limit for when searches should be ceased if unsuccessful, and it was difficult to know when to stop if no number could be found (or a less ideal number was found). We used our judgment to determine when to stop searching for phone numbers on a case-by-case basis. Second, we found that calling authors up to three times in diverse time zones took much longer to deliver and track as compared to sending a group of emails in one sitting. Third, there were unexpected challenges in reaching authors directly by telephone that were not anticipated by our protocol (e.g., the assistant of an author in the telephone group requested an email of our request, authors' voicemail requested email contact). Reviewers considering telephone contact as a strategy for author contact should consider and plan for such challenges. Despite these challenges, we found that when we were able to connect with authors by telephone directly, the peer-to-peer interaction was often very positive and typically led to survey completion.

Our study has several limitations. First, we contacted authors in English, which may have lowered the number of authors to receive the intervention and/or complete the survey. Specifically, the telephone contact intervention was delivered by one investigator (K.J.D.) who only spoke English and author emails and surveys were written in English. Because all studies included in the review were written in English, we believe authors had a sufficient working knowledge of English to respond to our requests, and indeed, we did not find any clear association between publication region and the effect of treatment on the response to the survey. Second, one researcher who was unblinded to the study hypothesis delivered both interventions and collected and analyzed study data. Although the researcher sought to deliver interventions according to protocol and measure outcomes without error, two protocol violations occurred in the delivery of the telephone intervention, and there were several errors in the measurement of time in both groups. However, the two protocol violations cannot account for the effect of the telephone intervention on the response proportion, and the errors in measurement of time were estimated to be equally distributed between groups and would not be expected to change interpretations. Third, the email intervention was delivered in a narrow time frame of 1 month, whereas the telephone intervention was delivered over 6 months. We do not expect that temporal trends markedly influenced results because the email response proportion of the email group in the trial (20.2%) was consistent with the response proportion before the trial (27.2%).

If author contact is to be considered as the best-practice approach for systematic reviews, further work is needed to optimize its effectiveness and efficiency. After six attempts of contact, we obtained a cumulative response proportion of 45% ($n = 126$ of 279 studies; 75 [27%] before randomization, 51 [18%] after randomization), leaving 55% of the surveys incomplete. In our review, we sought a fairly extensive amount of information from authors (i.e., information on the study's intervention, population, and setting) and called authors only after we failed to achieve a response from three previous email attempts. Future studies may consider evaluating the effectiveness of calling all authors upfront (rather than only after email) and asking for different types of additional information (e.g., limiting requests to information about treatment effects).

Additional research is needed to inform the extent to which review resources should be dedicated to obtaining ideal data through author contact compared with the conduct and/or optimization of other review processes. We found that a large amount of time was required to locate and contact some authors by telephone; although this effort increased costs, dedicating extra resources to reach nonresponding authors may be needed to avoid introducing systematic error [4]. To better understand the trade-offs in time and costs associated with author contact however, further work is needed to determine the value and trustworthiness of information obtained through author contact [21,28] and whether novel methods for information retrieval [29,30] can allow the reallocation of resources to author contact.

5. Conclusion

Contacting nonresponding authors of included studies for additional information by telephone increased response compared with repeat emailing but required more time and had higher cost. Our findings can inform methodological and budgeting decisions for future systematic reviews, especially those planning multiple waves of review updating.

CRediT authorship contribution statement

Kristin J. Danko: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Writing - original draft, Writing - review & editing. **Issa J. Dahabreh:** Conceptualization, Formal analysis, Funding acquisition, Investigation, Methodology, Supervision, Writing - review & editing. **Noah M. Ivers:** Conceptualization, Funding acquisition, Investigation, Methodology, Supervision, Writing - review & editing. **David Moher:** Conceptualization, Funding acquisition, Investigation, Methodology, Supervision, Writing - review & editing. **Jeremy M. Grimshaw:** Conceptualization, Investigation, Methodology, Resources, Supervision, Writing - review & editing.

Acknowledgments

The authors acknowledge the contributions of members of the systematic review team and knowledge users listed in Appendix A for their role in developing the author survey, Mr. Anton Saarimaki (Ottawa Hospital Research Institute) for help in developing and managing the online survey platform, and Mr. Jordi Pardo Pardo (Ottawa Hospital Research Institute) for feedback on early drafts of this article. The authors would also like to acknowledge the assistance of Mr. Samir Nasrali, Ms. Pauline Barbeau, and Mr. Mostafa Alabousi with data abstraction for the diabetes quality improvement review.

Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jclinepi.2019.05.027.

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