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Assessing the impact of token upfront incentives in a physician survey

Effect of Unconditional Incentives on Response Rates of Physician Postal Surveys

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Monica Taljaard: Study design, study guidance, interpretation of data, review of manuscript

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ABSTRACT

Objectives: Physicians are a commonly targeted group in health research surveys, but their response rates are often relatively low. The goal of this paper was to evaluate the effect of unconditional incentives in the form of a coffee card on physician postal survey response rates.

Design: Following 13 key informant interviews and 8 cognitive interviews a survey questionnaire was developed.

Participants: A random sample of 534 physicians, stratified by physician group (geriatricians, family physicians, emergency physicians) was selected from a national medical directory.

Setting: Using computer generated random numbers; half of the physicians in each stratum were allocated to receive a coffee card to a popular national coffee chain together with the first survey mailout.

Interventions: In a modified Dillman technique, we distributed the survey package, and up to 4 follow-up contacts including a final special contact using a courier package to non-responders.

Results: 265 (57.0%) physicians completed the survey. The response rate was significantly higher in the group allocated to receive the incentive (62.7% vs. 51.3% in the control group; $p = 0.01$).

Conclusions: Our results indicate that an unconditional incentive in the form of a coffee gift card can substantially improve physician response rates. Future research can look at the effect of varying amounts of cash on the gift cards on response rates.

Key words: Unconditional incentives, response rates, physician surveys

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Strengths:

- Survey conducted using rigorous methodological approaches including
 - Modified Dillman Technique
 - Key informant and cognitive interviews
 - Pilot Testing
 - Visual techniques
 - Pre-notification
 - Follow-ups
 - Special courier contact
- Random sample selection
- Random unconditional distribution of incentives to half of the physicians
- High response rate
- Minimal survey error
- Use of a representative sample

Limitations:

- Inability to check the effect of unconditional incentives within physician specialties
- Some physicians might have been missing from the sample frame
- We only studied the effect of a \$10 coffee card

INTRODUCTION

Postal surveys are an important research tool to ascertain physicians’ attitudes, knowledge, and practice patterns on different topics, but are recognized as a group from which it is often difficult to obtain high response rates.[1] There are a number of reasons why physicians do not respond to surveys including lack of time, low perceived importance of study, an increased volume of surveys they are asked to respond to and concerns with confidentiality.[2] However, to promote validity and generalizability of survey results , a high response rate must be achieved.[3] A well-known method of improving survey design and increasing response rates is the Dillman’s Tailored Design technique that is founded on social exchange theory.[4] Social exchange theory indicates that an individual will exchange knowledge or expertise with others when he or she thinks that the reward for the exchange is equal to or greater than the cost, and trusts or expects that the rewards will outweigh the costs in the long run.[4] Such strategies fall under two categories that one can use to improve response rates: incentive-based and design-based.[2] Some design-based approaches include a personalization of contacts[5,6], high interest factor[5], a shorter questionnaire[6], and follow-up contacts[6-8]. Research has shown that monetary incentives,[9-14] as well as incentives in the form of a lottery ticket[15,16] can increase response rates of physician surveys substantially. Information from the literature shows that incentives improve response rates but it is not clear how a gift card and its value can help improve response rates of physician surveys. The purpose of this study was to evaluate the effect of unconditional incentives in the form of a coffee card on response rates.

METHODS

Study Design and Participants

This study was a national self-administered postal survey of Canadian geriatricians, emergency physicians and family physicians. These physician groups were surveyed due to their

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involvement and treatment of elderly patients with minor injuries (i.e. lacerations, contusions, non-operative fractures, etc.). To be eligible for the study, the physicians must have been seeing elderly patients 65 years and older.

This was an *a-priori* sub-study to assess the effect of unconditional incentives, in the form of a \$10 coffee card, on response rates of physician surveys. The primary objective of the survey was to determine physician requirements with respect to the minimally important change and the required sensitivity for clinical decision rules to predict functional decline 6 months after sustaining a minor trauma.

Outcome Measures

The primary outcome was the physician response rate.

Questionnaire Development

The survey design was informed by Dillman's Tailored Design method.[17] In summary, the survey was developed in three stages: 1) key informant, in-person interviews (pre-survey), 2) cognitive interviews (draft survey), and 3) pilot-testing (final draft survey) using rigorous methodological approaches including a well-designed and worded questionnaire, inclusion of a tangible token of appreciation provided in advance, personalized pre-notification and cover letters, indication of a legitimate authority source, enhanced questionnaire arrangements and visual appeal, inclusion of a postage paid return envelope, up to four reminders with a blank questionnaire and a special contact using Xpresspost.

The final questionnaire consisted of 13 questions, broken down into five sections and printed on two single-sided pages. Pre-notification letters, English questionnaires, and cover letters were translated into French by a medical translator and administered to those physicians who had indicated French as their language of correspondence in the Canadian Medical

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Directory. The questionnaire consisted of an eligibility question (1 item), demographic and practice settings (7 items), assessment and measurement of functional decline (3 items), relevance of ADL/IADL items to functional decline (1 item), and required sensitivity for the clinical decision tool (1 item).

Substantial effort was put into the survey design to ensure the survey questionnaire was relevant, clear and concise. The pre-notification letters as well as the cover letters were all hand signed. The survey was personalized for each physician so that the physician’s name, area of expertise and affiliation were printed on the cover letter.

Sample Selection

A stratified random sample of 534 physicians (178 emergency physicians, 178 geriatricians, and 178 family physicians) was selected, using computer-generated random numbers, from the Canadian Medical Directory. Of the 534 physicians, 101 (23 emergency physicians, 36 geriatricians, and 42 family physicians) were mailed French-translated surveys.

Half of the physicians within each physician group were subsequently randomly allocated by computer to either receive a monetary incentive or be a control. Allocation concealment was achieved by this process.

Intervention

Physicians allocated to the incentive received a \$10 Tim Horton’s coffee card (a large national coffee chain) with the first survey. The cover letter indicated that this card was an incentive in recognition of their time. All other aspects of the pre-notification, cover letters and survey instrument were identical to those in the control group. Respondents were blind to the intervention and so would not be aware that others may have received a different or no incentive.

Survey Administration

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The survey administration was informed by Dillman's Tailored Design method.¹⁷ We pre-tested the survey using a convenience sample of 16 local physicians, from the randomly selected 534 physicians, to determine if there were any shortcomings with the survey process in terms of mail delivery and management of the surveys as well as ensuring the questionnaire was accurate in terms of sentence structure and format of the input fields. After we were satisfied with the survey process and questionnaire, we mailed the remaining 518 English and French surveys. The survey package consisted of a cover letter, a questionnaire, and a prepaid business reply mail envelope. A week after the pre-notification letter, we mailed the first survey questionnaire, along with the coffee card, if applicable. A reminder with a questionnaire was systematically mailed every third week. Questionnaires were tracked using a unique number to avoid resending a questionnaire to the physicians that responded or those that had moved from the address we had on file. A final reminder survey was mailed using express courier service (Xpresspost). Compared to the regular mail, the Xpresspost is delivered nationally within two business days in a specialized envelope with dimensions of 15.2 cm by 26.0 cm, with the wording "Xpresspost" plus the ability to track and confirm the delivery of the mail. In contrast, the regular mail is a plain envelope with dimensions 10.5 cm by 24.1 cm that is delivered within four business days with no tracking and no confirmation of delivery.

Researchers coordinating this study were located at the Ottawa Hospital Research Institute in Ottawa, Ontario, Canada. The study was provided expedited review and approval by the Ottawa Health Science Network Research Ethics Board.

Data Analysis

Descriptive statistics were used to summarize physician responses. Chi-squared tests were conducted to compare characteristics of respondents and non-respondents and to explore

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the risk of non-response bias. Chi-squared tests were also conducted to determine whether the response rates of the physicians who received the incentives were significantly higher than those who did not receive the incentives for the overall and within the subgroups. Line graphs were generated to present the response rates over time with each survey mailing. Two-sided significance tests were set at an alpha level of 0.05. Two demographic variables (language of correspondence and geographic region: Western Canada, Ontario, Quebec, Eastern Canada) were used to examine the possibility of non-response bias.

The sample size of 534 was determined to support the primary objective of the main study on determining the required sensitivity for a clinical decision rule. It was determined to yield a two-sided 95% confidence interval around the mean estimated sensitivity with a maximum width of 4 for each specialty, accounting for the finite population correction factor and an anticipated response rate of 55%.

Data were analyzed using SAS version 9.2 (SAS Institute, Cary, NC).

RESULTS

Respondents

Demographic characteristics of the respondents are presented in Table 1. A slightly higher proportion (55.1%) of respondents was male, reflecting the higher prevalence of males in the survey population; 76.5% of the physicians had been in practice for 10 or more years.

Two demographic variables (language of correspondence and geographic region: Western Canada, Ontario, Quebec, Eastern Canada) were used to examine the possibility of non-response bias. Chi-squared analyses showed no significant differences in response rates among the English and French-speaking physicians (p-value: 0.59; Table 2). Similarly, there was no

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indication of a significant difference in response rates when we compared the regions (p-value: 0.29). These are minimal tests for non-response bias that we were able to conduct.

Response Rate

Of the 534 physicians surveyed, 27 were not reachable because they had moved and 42 were ineligible as they were no longer practicing or were not seeing elderly patients. Of the 465 eligible physicians, 265 completed and returned the survey (including the 12 of the 16 physicians from the local pilot survey) resulting in an overall response rate of 57.0%. In general the conditional response rates (i.e. response rates among remaining non-responders), declined with each contact except for the courier service which had an increased conditional response rate.

The response rate of the physicians who received a \$10 coffee gift card (62.7%) was significantly higher than the response rate of the physicians who did not receive the coffee card (51.3%), absolute difference 11.4%, $p = 0.01$; Figure 2). When looking at the subgroups of individual physician groups, the response rate of the geriatricians who received an incentive (77.8%) were significantly higher ($p = 0.04$) than the response rate of the geriatricians who did not receive an incentive (63.5%). The response rates for emergency physicians and family physicians with incentives (56.8% and 52.1%, respectively) were higher than for those who did not receive incentives (46.7% and 41.7%, respectively) but differences were not statistically significant ($p = 0.21$ and $p = 0.21$, respectively).

DISCUSSION

We found that physicians who received a coffee card had a significantly higher response rate than physicians who did not receive this incentive. All three physician groups demonstrated similar increased response rates with incentive use.

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These results are consistent with the work of other investigators who have reported increased response rates with incentives.[2,11,12, 14] Unlike some of the studies, this study provided unconditional incentives that were randomly given to a random sample of physicians. While other researchers looked at the effect of incentives on a select group of physicians we studied the effect of incentives on different specialties that had different interest levels for the study. Other investigators have shown that unconditional incentives generate higher response rates than conditional and delayed incentives.[13] This study looked at coffee gift cards instead of cash or cheque incentives. Our results show that monetary incentives, even in a form of a coffee gift card, help increase response rates significantly. One of the main reasons why such a strategy of an unconditional incentive improves response rates relates to trust in the context of social exchange theory. We build trust with the physicians by providing an incentive with the first survey. Another reason for obtaining higher response rates with incentives is that the physicians feel obliged to respond after they receive the incentive. Our results suggest that physicians do not need a large incentive to respond as long as the incentive is in the form of a monetary incentive.

This was an a-priori sub-study to assess the effect of unconditional incentives on response rates, our primary outcome was to define functional decline and determine the required sensitivity for a clinical decision tool to identify elderly patients at high risk of functional decline. Although the incentives help increase response rates it is possible that there is an interaction effect between the incentives and relevance of the study as with our study that was very relevant to the geriatricians. Further research is needed to study the effect of a combination of methods on response rates.

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Study Limitations

There are a few limitations with this study. There is a possibility of not having all the physicians across the country included in the directory which could lead to a biased sample. However, these limitations are minimal as the Medical Directory is known to be very accurate.

A limitation with this study is a low power to test for the effect of unconditional incentives within physician specialties. We also did not test other types of incentives or the effect of alternative amounts of incentives. This will need to be assessed based on the study being conducted, where scientific rigor with an improved response rate and less chance of nonresponse error needs to be balanced with the value of the study question and the need for a scientifically reliable answer.

Future Research

Future studies could expand on this study by testing different amounts of coffee card values and their association with response rates. Further research can look into the effect of special contacts with and without incentives as there could be an interaction effect when using a combination of a special contact with an incentive. The effect of such a special contact could be studied further by looking at its effect on different physician specialties since not all physicians have the same work-office work environment. Future studies should also assess the use of unconditional incentives for electronic surveys.

Conclusion

We found that incentives, in the form of a \$10 coffee gift card, significantly improved physician response rates. We therefore encourage investigators conducting physician surveys to routinely include incentives in order to improve response rates and lessen the risk of non-response bias.

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Figure Legends

Table 1. Respondent Demographics.

Table 2. Chi-Squared Tests of Non-response Bias

Figure 1. Response Rates for Incentive vs. No-incentive Arms by Physician Subgroups

Figure 2. Cumulative Response Rate With and Without Incentives

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Table 1. Respondent Demographics.

Characteristic	# (%) of Intervention Group Respondents (N=146)	# (%) of Control Group Respondents (N=119)
Specialty		
Geriatricians	63 (43.2)	54 (45.4)
Family physicians	37 (25.3)	30 (25.2)
Emergency physicians	46 (31.5)	35 (29.4)
Gender		
Male	71 (48.6)	75 (63.0)
Female	75 (51.4)	44 (37.0)
Age		
< 35	13 (8.9)	7 (5.9)
35-44	55 (37.7)	33 (27.7)
45-54	38 (26.0)	38 (31.9)
≥ 55	38 (26.0)	40 (33.6)
Years in Practice		
< 10	36 (24.7)	22 (18.5)
10-19	57 (39.0)	38 (31.9)
≥ 20	51 (34.9)	58 (48.7)
Years of Residency Training		
< 3	40 (27.4)	26 (21.9)
3-5	73 (50.0)	64 (53.8)
> 5-9	26 (17.8)	25 (21.0)
≥ 10	2 (1.4)	2 (1.7)
Number of Patients Seen / Week		
≤ 28	40 (27.4)	27 (22.7)
29-60	34 (23.3)	37 (31.1)
61-100	35 (24.0)	30 (25.2)
> 100	34 (23.3)	23 (19.3)
Number of Elderly Patients Seen / Week		
≤ 20	46 (31.5)	33 (27.7)
21-30	31 (21.2)	28 (23.5)
31-50	35 (24.0)	34 (28.6)
> 50	27 (18.5)	19 (16.0)

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Table 2. Chi-Squared Tests of Non-response Bias

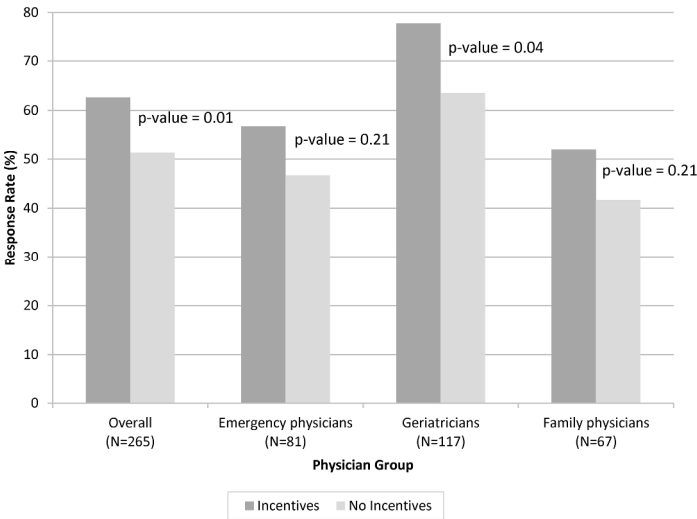
Characteristic	Respondents % (n)	Non-respondents % (n)	P-value
Language of the Questionnaire			0.59
English	81.5 (216)	79.5 (159)	
French	18.5 (49)	20.5 (41)	
Region			0.29
Western Canada ^a	28.3 (75)	33.5 (67)	
Ontario	41.5 (110)	38.0 (76)	
Quebec	21.5 (57)	23.5 (47)	
Eastern Canada ^b	8.7 (23)	5.0 (10)	

^a British Columbia, Alberta, Saskatchewan, Manitoba, Yukon Territory

^b New Brunswick, Nova Scotia, Newfoundland

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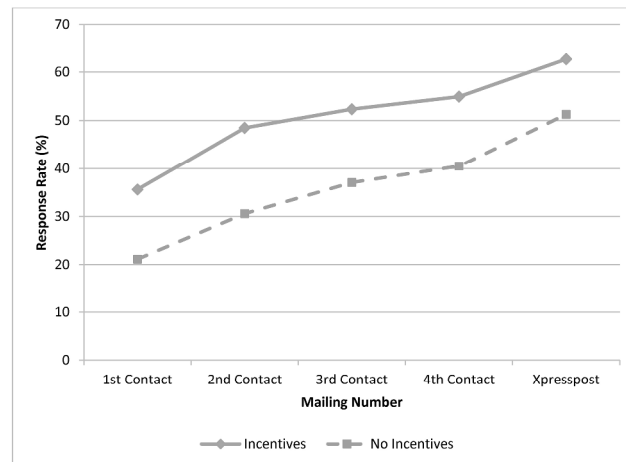
Figure 1. Response Rates for Incentive vs. No-incentive Arms by Physician Subgroups



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Figure 2. Cumulative Response Rate With and Without Incentives



279x361mm (300 x 300 DPI)

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation	Page
Title and abstract	1	(a) Indicate the study’s design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	5
Objectives	3	State specific objectives, including any prespecified hypotheses	
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6
Participants	6	(a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up	6
		Case-control study—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls	
		Cross-sectional study—Give the eligibility criteria, and the sources and methods of selection of participants	
		(b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed	
		Case-control study—For matched studies, give matching criteria and the number of controls per case	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	
Bias	9	Describe any efforts to address potential sources of bias	
Study size	10	Explain how the study size was arrived at	
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	8
		(b) Describe any methods used to examine subgroups and interactions	
		(c) Explain how missing data were addressed	
		(d) Cohort study—If applicable, explain how loss to follow-up was addressed	
		Case-control study—If applicable, explain how matching of cases and controls was addressed	
		Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy	
		(e) Describe any sensitivity analyses	

Continued on next page

Results			Page
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram	9
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest (c) <i>Cohort study</i> —Summarise follow-up time (eg, average and total amount)	9
Outcome data	15*	<i>Cohort study</i> —Report numbers of outcome events or summary measures over time <i>Case-control study</i> —Report numbers in each exposure category, or summary measures of exposure <i>Cross-sectional study</i> —Report numbers of outcome events or summary measures	9
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	10
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	
Discussion			10-11
Key results	18	Summarise key results with reference to study objectives	
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	
Generalisability	21	Discuss the generalisability (external validity) of the study results	
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	1

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

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National Survey of Physicians to Determine the Effect of Unconditional Incentives on Response Rates of Physician Postal Surveys

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ABSTRACT

Objectives: Physicians are a commonly targeted group in health research surveys, but their response rates are often relatively low. The goal of this paper was to evaluate the effect of unconditional incentives in the form of a coffee card on physician postal survey response rates.

Design: Following 13 key informant interviews and 8 cognitive interviews a survey questionnaire was developed.

Participants: A random sample of 534 physicians, stratified by physician group (geriatricians, family physicians, emergency physicians) was selected from a national medical directory.

Setting: Using computer generated random numbers; half of the physicians in each stratum were allocated to receive a coffee card to a popular national coffee chain together with the first survey mailout.

Interventions: The intervention was a \$10 Tim Hortons gift card given to half of the physicians who were randomly allocated to receive the incentive.

Results: 265 (57.0%) physicians completed the survey. The response rate was significantly higher in the group allocated to receive the incentive (62.7% vs. 51.3% in the control group; $p = 0.01$).

Conclusions: Our results indicate that an unconditional incentive in the form of a coffee gift card can substantially improve physician response rates. Future research can look at the effect of varying amounts of cash on the gift cards on response rates.

Key words: Unconditional incentives, response rates, physician surveys

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Strengths:

- Survey conducted using rigorous methodological approaches known to increase survey response rates such as Modified Dillman Techniques, key informant and cognitive interviews, pilot testing and a special contact
- Random sample selection
- Random unconditional distribution of incentives to half of the physicians
- High response rate
- Minimal survey error
- Use of a representative sample

Limitations:

- Inability to check the effect of unconditional incentives within physician specialties
- Some physicians might have been missing from the sample frame
- We only studied the effect of a \$10 coffee card

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INTRODUCTION

Postal surveys are an important research tool to ascertain physicians' attitudes, knowledge, and practice patterns on different topics, but are recognized as a group from which it is often difficult to obtain high response rates.[1] There are a number of reasons why physicians do not respond to surveys including lack of time, low perceived importance of study, an increased volume of surveys they are asked to respond to and concerns with confidentiality.[2] However, to promote validity and generalizability of survey results, a high response rate must be achieved.[3] A well-known method of improving survey design and increasing response rates is the Dillman's Tailored Design technique that is founded on social exchange theory.[4] Social exchange theory indicates that an individual will exchange knowledge or expertise with others when he or she thinks that the reward for the exchange is equal to or greater than the cost, and trusts or expects that the rewards will outweigh the costs in the long run.[4] Such strategies fall under two categories that one can use to improve response rates: incentive-based and design-based.[2] Some design-based approaches include a personalization of contacts[5,6], high interest factor[5], a shorter questionnaire[6], and follow-up contacts[6-8]. Research has shown that monetary incentives,[9-14] as well as incentives in the form of a lottery ticket[15,16] can increase response rates of physician surveys substantially. Information from the literature shows that incentives improve response rates but it is not clear how a gift card and its value can help improve response rates of physician surveys. The purpose of this study was to evaluate the effect of unconditional incentives in the form of a coffee card on response rates.

METHODS

Study Design and Participants

This study was a national self-administered postal survey of Canadian geriatricians, emergency physicians and family physicians. These physician groups were surveyed due to their

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This was an *a-priori* sub-study to assess the effect of unconditional incentives, in the form of a \$10 coffee card, on response rates of physician surveys. The study was conducted from April 2012 through November 2012. The primary objective of the survey was to determine physician requirements with respect to the minimally important change and the required sensitivity for clinical decision rules to predict functional decline 6 months after sustaining a minor trauma.

Outcome Measures

The primary outcome was the physician response rate.

Questionnaire Development

The survey design was informed by Dillman’s Tailored Design method.[17] In summary, the survey was developed in three stages: 1) key informant, in-person interviews (pre-survey), 2) cognitive interviews (draft survey), and 3) pilot-testing (final draft survey) using rigorous methodological approaches including a well-designed and worded questionnaire, inclusion of a tangible token of appreciation provided in advance, personalized pre-notification and cover letters, indication of a legitimate authority source, enhanced questionnaire arrangements and visual appeal.

The final questionnaire consisted of 13 questions, broken down into five sections and printed on two single-sided pages. Pre-notification letters, English questionnaires, and cover letters were translated into French by a medical translator and administered to those physicians who had indicated French as their language of correspondence in the Canadian Medical

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Directory. The questionnaire consisted of an eligibility question (1 item), demographic and practice settings (7 items), assessment and measurement of functional decline (3 items), relevance of ADL/IADL items to functional decline (1 item), and required sensitivity for the clinical decision tool (1 item).

Substantial effort, including design techniques, key informant interviews, cognitive interviews, and pilot-testing was put into the survey design to ensure the survey questionnaire was relevant, clear and concise. The pre-notification letters as well as the cover letters were all hand signed. The survey was personalized for each physician so that the physician's name, area of expertise and affiliation were printed on the cover letter.

Sample Selection

A stratified random sample of 534 physicians (178 emergency physicians, 178 geriatricians, and 178 family physicians) was selected, using computer-generated random numbers, from the Canadian Medical Directory. Of the 534 physicians, 101 (23 emergency physicians, 36 geriatricians, and 42 family physicians) were mailed French-translated surveys.

Half of the physicians within each physician group were subsequently randomly allocated by computer to either receive a monetary incentive or be a control. Allocation concealment was achieved by this process.

Intervention

Physicians allocated to the incentive received a \$10 Tim Horton's coffee card (a large national coffee chain) with the first survey. The cover letter indicated that this card was an incentive in recognition of their time. All other aspects of the pre-notification, cover letters and survey instrument were identical to those in the control group. Respondents were blind to the intervention and so would not be aware that others may have received a different or no incentive.

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Survey Administration

The survey administration was informed by Dillman’s Tailored Design method.¹⁷ We pre-tested the survey using 16 local physicians, from the randomly selected 534 physicians, to determine if there were any shortcomings with the survey process in terms of mail delivery and management of the surveys as well as ensuring the questionnaire was accurate in terms of sentence structure and format of the input fields. After we were satisfied with the survey process and questionnaire, we mailed the remaining 518 English and French surveys. The survey package consisted of a cover letter, a questionnaire, and a prepaid business reply mail envelope. A week after the pre-notification letter, we mailed the first survey questionnaire, along with the coffee card, if applicable. A reminder with a questionnaire was systematically mailed every third week. Questionnaires were tracked using a unique number to avoid resending a questionnaire to the physicians that responded or those that had moved from the address we had on file. A final reminder survey was mailed using express courier service (Xpresspost). Compared to the regular mail, the Xpresspost is delivered nationally within two business days in a specialized envelope with dimensions of 15.2 cm by 26.0 cm, with the wording “Xpresspost” plus the ability to track and confirm the delivery of the mail. In contrast, the regular mail is a plain envelope with dimensions 10.5 cm by 24.1 cm that is delivered within four business days with no tracking and no confirmation of delivery.

Researchers coordinating this study were located at the Ottawa Hospital Research Institute in Ottawa, Ontario, Canada. The study was provided expedited review and approval by the Ottawa Health Science Network Research Ethics Board.

Data Analysis

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Descriptive statistics were used to summarize physician responses. Chi-squared tests were conducted to compare characteristics of respondents and non-respondents and to explore the risk of non-response bias. Chi-squared tests were also conducted to determine whether the response rates of the physicians who received the incentives were significantly higher than those who did not receive the incentives for the overall and within the subgroups. Line graphs were generated to present the response rates over time with each survey mailing. Two-sided significance tests were set at an alpha level of 0.05. Two demographic variables (language of correspondence and geographic region: Western Canada, Ontario, Quebec, Eastern Canada) were used to examine the possibility of non-response bias.

The sample size of 534 was determined to support the primary objective of the main study on determining the required sensitivity for a clinical decision rule. It was determined to yield a two-sided 95% confidence interval around the mean estimated sensitivity with a maximum width of 4 for each specialty, accounting for the finite population correction factor and an anticipated response rate of 55%.

Data were analyzed using SAS version 9.2 (SAS Institute, Cary, NC).

RESULTS

Respondents

Demographic characteristics of the respondents are presented in Table 1. A slightly higher proportion (55.1%) of respondents was male, reflecting the higher prevalence of males in the survey population as per the Canadian Medical Directory; 76.5% of the physicians had been in practice for 10 or more years.

Two demographic variables (language of correspondence and geographic region: Western Canada, Ontario, Quebec, Eastern Canada) were used to examine the possibility of non-

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response bias. Chi-squared analyses showed no significant differences in response rates among the English and French-speaking physicians (p-value: 0.59; Table 2). Similarly, there was no indication of a significant difference in response rates when we compared the regions (p-value: 0.29). These are minimal tests for non-response bias that we were able to conduct.

Response Rate

Of the 534 physicians surveyed, 27 were not reachable because they had moved and 42 were ineligible as they were no longer practicing or were not seeing elderly patients. Of the 465 eligible physicians, 265 completed and returned the survey (including the 12 of the 16 physicians from the local pilot survey) resulting in an overall response rate of 57.0% (95% confidence interval (CI), 52.4-61.5%). In general the conditional response rates (i.e. response rates among remaining non-responders), declined with each contact except for the courier service which had an increased conditional response rate, Figure 1.

The response rate of the physicians who received a \$10 coffee gift card (62.7%; 95% CI, 56.1-68.9%) was significantly higher than the response rate of the physicians who did not receive the coffee card (51.3%; 95% CI, 44.7-57.9%), absolute difference 11.4%, p = 0.01; Figure 2). When looking at the subgroups of individual physician groups, the response rate of the geriatricians who received an incentive (77.8%; 95% CI, 67.2-86.3%) were significantly higher (p = 0.04) than the response rate of the geriatricians who did not receive an incentive (63.5%; 95% CI, 52.4-73.7%). The response rates for emergency physicians and family physicians with incentives (56.8% [95% CI, 45.3-67.8%] and 52.1% [95% CI, 39.9-64.1%], respectively) were higher than for those who did not receive incentives (46.7% [95% CI, 35.1-58.6%] and 41.7% [95% CI, 30.2-53.9%], respectively) but differences were not statistically significant (p = 0.21 and p = 0.21, respectively).

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DISCUSSION

We found that physicians who received a coffee card had a significantly higher response rate than physicians who did not receive this incentive. All three physician groups demonstrated similar increased response rates with incentive use.

These results are consistent with the work of other investigators who have reported increased response rates with incentives.[2,11,12, 14] Unlike some of the studies, this study provided unconditional incentives that were randomly given to a random sample of physicians. While other researchers looked at the effect of incentives on a select group of physicians we studied the effect of incentives on different specialties that had different interest levels for the study. Other investigators have shown that unconditional incentives generate higher response rates than conditional and delayed incentives.[13] This study looked at coffee gift cards instead of cash or cheque incentives. Our results show that monetary incentives, even in a form of a coffee gift card, help increase response rates significantly. One of the main reasons why such a strategy of an unconditional incentive improves response rates relates to trust in the context of social exchange theory. We build trust with the physicians by providing an incentive with the first survey. Another reason for obtaining higher response rates with incentives is that the physicians feel obliged to respond after they receive the incentive. Although larger incentives are more effective in increasing response rates our results suggest that a \$10 coffee card, that could buy about seven medium-sized cups of coffee at the time of the study, is sufficient to help increase the response rates of physicians significantly.[18]

This was an a-priori sub-study to assess the effect of unconditional incentives on response rates, our primary outcome was to define functional decline and determine the required sensitivity for a clinical decision tool to identify elderly patients at high risk of functional

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decline. Although the incentives help increase response rates it is possible that there is an interaction effect between the incentives and relevance of the study as with our study that was very relevant to the geriatricians. Further research is needed to study the effect of a combination of methods on response rates.

Study Limitations

There are a few limitations with this study. There is a possibility of not having all the physicians across the country included in the directory which could lead to a biased sample. However, these limitations are minimal as the Medical Directory is known to be very accurate.

A limitation with this study is a low power to test for the effect of unconditional incentives within physician specialties. We also did not test other types of incentives or the effect of alternative amounts of incentives. This will need to be assessed based on the study being conducted, where scientific rigor with an improved response rate and less chance of nonresponse error needs to be balanced with the value of the study question and the need for a scientifically reliable answer.

Future Research

Future studies could expand on this study by testing different amounts of coffee card values and their association with response rates. Further research can look into the effect of special contacts with and without incentives as there could be an interaction effect when using a combination of a special contact with an incentive. The effect of such a special contact could be studied further by looking at its effect on different physician specialties since not all physicians have the same work-office work environment. Future studies should also assess the use of unconditional incentives for electronic surveys.

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Conclusion

We found that incentives, in the form of a \$10 coffee gift card, significantly improved physician response rates. We therefore encourage investigators conducting physician surveys to routinely include incentives in order to improve response rates and lessen the risk of non-response bias.

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Author Contributions:

Kasim Abdulaziz: Study design, survey mailing, data analysis, interpretation of data, and preparation of manuscript

Jeffrey J. Perry: Study design, interpretation of data, preparation of manuscript

Jamie Brehaut: Study design, interpretation of data, preparation of manuscript

Monica Taljaard: Study design, interpretation of data, preparation of manuscript

Marcel Émond: Study design, funding, preparation of manuscript

Laura Wilding: Study design, preparation of manuscript

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3 Marie-Josée Sirois: Study design, preparation of manuscript

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6 Jacques Lee: Study design, preparation of manuscript

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Figure Legends

Table 1. Respondent Demographics.

Table 2. Chi-Squared Tests of Non-response Bias

Figure 1. Response Rates for Incentive vs. No-incentive Arms by Physician Subgroups

Figure 2. Cumulative Response Rate With and Without Incentives

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Table 19. Respondent Demographics.

Characteristic	# (%) of Respondents (N=265)
Specialty	
Geriatricians	117 (44.2)
Family physicians	67 (25.3)
Emergency physicians	81 (30.6)
Gender	
Male	146 (55.1)
Female	119 (44.9)
Age	
< 35	20 (7.5)
35-44	88 (33.2)
45-54	76 (28.7)
≥ 55	78 (29.4)
Missing	3 (1.1)
Years in Practice	
< 10	58 (21.9)
10-19	95 (35.8)
≥ 20	109 (41.1)
Missing	3 (1.1)
Years of Residency Training	
< 3	66 (24.9)
3-5	137 (51.7)
> 5-9	51 (19.2)
≥ 10	4 (1.5)
Missing	7 (2.6)
Number of Patients Seen / Week	
≤ 28	67 (25.3)
29-60	71 (26.8)

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61-100	65 (24.5)
> 100	57 (21.5)
Missing	5 (1.9)
Number of Elderly Patients Seen / Week	
≤ 20	79 (29.8)
21-30	59 (22.3)
31-50	69 (26.0)
> 50	46 (17.4)
Missing	12 (4.5)

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Table 2. Chi-Squared Tests of Non-response Bias

Characteristic	Respondents % (n)	Non-respondents % (n)	P-value
Language of the Questionnaire			0.59
English	81.5 (216)	79.5 (159)	
French	18.5 (49)	20.5 (41)	
Region			0.29
Western Canada ^a	28.3 (75)	33.5 (67)	
Ontario	41.5 (110)	38.0 (76)	
Quebec	21.5 (57)	23.5 (47)	
Eastern Canada ^b	8.7 (23)	5.0 (10)	

^a British Columbia, Alberta, Saskatchewan, Manitoba, Yukon Territory

^b New Brunswick, Nova Scotia, Newfoundland

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation	Page
Title and abstract	1	(a) Indicate the study’s design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	5
Objectives	3	State specific objectives, including any prespecified hypotheses	
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6
Participants	6	(a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up Case-control study—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls Cross-sectional study—Give the eligibility criteria, and the sources and methods of selection of participants (b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed Case-control study—For matched studies, give matching criteria and the number of controls per case	6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	
Bias	9	Describe any efforts to address potential sources of bias	
Study size	10	Explain how the study size was arrived at	
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed (d) Cohort study—If applicable, explain how loss to follow-up was addressed Case-control study—If applicable, explain how matching of cases and controls was addressed Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy (e) Describe any sensitivity analyses	8

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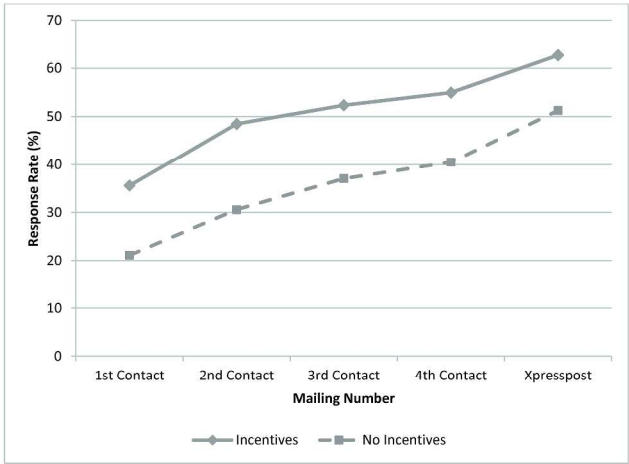
Results			Page
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram	9
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest (c) <i>Cohort study</i> —Summarise follow-up time (eg, average and total amount)	9
Outcome data	15*	<i>Cohort study</i> —Report numbers of outcome events or summary measures over time <i>Case-control study</i> —Report numbers in each exposure category, or summary measures of exposure <i>Cross-sectional study</i> —Report numbers of outcome events or summary measures	9
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	10
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	
Discussion			10-11
Key results	18	Summarise key results with reference to study objectives	
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	
Generalisability	21	Discuss the generalisability (external validity) of the study results	
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	1

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

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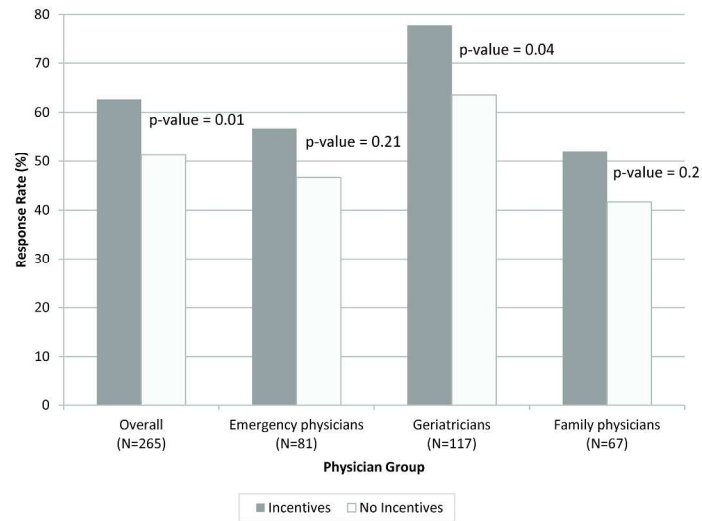
Figure 1. Cumulative Response Rate With and Without Incentives



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Figure 2. Response Rates for Incentive vs. No-incentive Arms by Physician Subgroups



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