

# A survey of Ontario chiropractors: their views on maximizing patient compliance to prescribed home exercise

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**OBJECTIVE:** *The objective of this study was to compile an inventory of the strategies most frequently used by Ontario chiropractors in their efforts to maximize patient compliance to prescribed home exercise.*

**DESIGN:** *The design consisted of a cross-sectional self-report web-based survey of Ontario chiropractors.*

**PARTICIPANTS:** *Eligible participants consisted of chiropractors in active practice in Ontario (treating, on average, at least 1 patient per week) and prescribing home exercises at least once in the last 30 days.*

**RESULTS:** *The compliance strategies used most frequently by Ontario chiropractors were: keeping instructions simple (82%, 95% CI = 75–90%); motivating patients by explaining exercises in a positive and enthusiastic manner (81%, 95% CI = 74–89%); giving patients encouragement, support and praise (80%, 95% CI = 72–88%); prescribing exercises that require low-cost equipment (70%, 95% CI = 61–78%); and supplying patients with material that helps demonstrate the exercises (62%, 95% CI = 53–71%) and educating patients by discussing the importance of and benefits to exercise (62%, 95% CI = 53–71%).*

**CONCLUSION:** *There appeared to be respondent consensus on the main compliance strategies used by Ontario chiropractors. Now that we have a current listing*

**OBJECTIF:** *l'objectif de cette étude était de compiler un inventaire des stratégies les plus fréquemment utilisées par les chiropraticiens ontariens dans leur effort visant à inciter les patients à accepter de faire des exercices à la maison,*

**ÉTUDE :** *l'étude consistait en une auto évaluation transversale à partir d'un sondage Web auprès des chiropraticiens ontariens.*

**PARTICIPANTS :** *les participants admissibles étaient les chiropraticiens en activité professionnelle en Ontario (traitant en moyenne au moins un patient par semaine) et qui avaient prescrit des exercices à faire à la maison au moins une fois au cours des 30 derniers jours.*

**RÉSULTATS :** *Les stratégies d'incitation au respect du traitement prescrit les plus fréquemment utilisées par les chiropraticiens ontariens étaient les suivantes : s'en tenir à donner des instructions simples (82 %, 95 % CI = 75-90 %); motiver les patients en leur expliquant les exercices d'une façon positive et enthousiaste (81 %, 95 % CI = 74-89 %); féliciter les patients , les encourager et les soutenir dans leurs efforts (80 %, 95 % Cf = 72-88 %); prescrire des exercices qui n'exigent pas d'équipement coûteux (70 %, 95 % CI = 61-78 %), fournir aux patients le matériel permettant de montrer comment faire les exercices (62 %, 95 % CI = 53-71 %) et faire comprendre aux patient l'importance et le*

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We would like to express our gratitude to the Ontario Chiropractic Association for funding support for this project.

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of these, further research should focus on the effectiveness of these main compliance strategies. (JCCA 2006; 50(2):140–155)

KEY WORDS: patient compliance; compliance; exercise; exercise therapy.

### Introduction

It is generally believed that exercise facilitates the therapeutic outcome and degree of recovery of chiropractic treatment;<sup>1,2</sup> consequently, home exercise prescription is a popular practice among chiropractors. It has been reported that 96% of U.S.,<sup>1</sup> 93% of Australian,<sup>1</sup> 96.5% of Canadian,<sup>3</sup> and 97.9% of Ontario chiropractors<sup>3</sup> used exercise as part of the treatment plan. Theoretically, if performed properly, home exercise programs provide an ideal bridge between in-office chiropractic treatments and offer a practical, cost-effective method of therapy; however, even the most well-intentioned patient may struggle to comply with a home exercise regimen. Most chiropractors would agree that motivating patients to comply with home exercise is difficult;<sup>4–6</sup> but a patient must perform exercise regularly to gain any of the potential therapeutic benefits of exercise. As such, non-compliance to home exercise does little to facilitate treatment and may be a significant obstacle in optimal treatment outcome.

Little is known about factors that affect patient compliance to home exercise. Few papers offer suggestions on how to *maximize* home exercise. The literature revealed four chiropractic studies, which attempt to address compliance factors. A review by Milroy and O'Neil<sup>6</sup> identified barriers to exercise prescribed by chiropractors and emphasized the importance of recognizing these barriers on an individual basis for appropriate management. The same authors also stated that goal-setting and identifying whether a patient is internally or externally motivated

*bienfait des exercices, au moyen de la communication (62 %, 95 % CI = 53-71 %),*

CONCLUSION : *il apparaît qu'il y a un consensus réactionnel en ce qui a trait aux stratégies d'incitation principales utilisées par les chiropraticiens ontariens. Maintenant que nous disposons d'une liste actuelle de ces stratégies, la recherche future devrait se concentrer sur l'efficacité de ces stratégies d'incitation principale.* (JCCA 2006; 50(2):140–155)

MOTS CLÉS : incitation des patients, incitation; exercice; thérapie par l'exercice.

(i.e., internal or external locus of control) are key factors in managing compliance.

Merritt<sup>7</sup> suggested that the *type* of exercise equipment might influence compliance. Merritt's case study reported that the use of a gym ball improved both exercise compliance and low-back pain in one patient "with a history of recurring low back pain and a poor record of exercise compliance".<sup>7</sup> Lew asserted that using a step-by-step approach that involves "carefully interviewing the patients and learning all of their daily habits ..." will enhance compliance to self-care regimens.<sup>8</sup>

Finally, Christensen offered insight into chiropractic patient compliance to home exercise.<sup>4,5,9,10</sup> He contended that a monitored home exercise program is the solution to patient non-compliance. Christensen asserted that frequent monitoring, graduated progression, simple instructions, prescribing fewer exercises, use of an exercise log, and guided practice will improve patient compliance.<sup>5,10</sup> He suggested that chiropractors demonstrate exercises and follow-up on subsequent visits to ensure exercises are performed correctly.<sup>9</sup> Christensen also encouraged chiropractors, and their staff, to praise and acknowledge their patients efforts toward exercising.<sup>9</sup>

Given the paucity of research on exercise compliance as part of chiropractic treatment, an exploration of the literature from other health professions on exercise compliance was warranted, because the strategies used to maximize compliance in other health fields may apply to chiropractors. Exercise compliance and how it relates to specific conditions such as cardiovascular disease,<sup>11–15</sup>

diabetes,<sup>16</sup> geriatric-related conditions,<sup>17-19</sup> urinary incontinence,<sup>20,21</sup> and obesity<sup>22,23</sup> predominated the literature. Some of the literature offered insight into the predictive factors of complying (for example, by applying models like the “Health Belief Model” and “Health Locus of Control”) and barriers to exercise.<sup>24-26</sup> In the primary care setting, financial incentive<sup>27</sup> and physician characteristics<sup>28</sup> positively influenced compliance in the short- but not the long-term. In the physiotherapy literature, goal-setting,<sup>29</sup> prescribing fewer (2 vs. 8) exercises<sup>19</sup> had no effect on compliance in the short-term unless, as was the case in the Taimela *et al.* study,<sup>30</sup> the patients are exceptionally motivated. The low back pain literature suggested that while motivation<sup>31</sup> and written/illustrated instructions<sup>32</sup> showed improved short-term compliance, a positive influence on long-term compliance was either not found<sup>31</sup> or investigated.<sup>32</sup>

Given the general paucity of research dealing with maximizing patient compliance to home exercise, it follows that there is a deficiency of knowledge regarding feasible, field-tested methods for maximizing patient compliance to prescribed home exercise by chiropractors. Generating an inventory of their favorite, most frequently used approaches to maximizing patient home exercise compliance will undoubtedly assist in focusing further research in this area, and it was therefore the purpose of this study to compile such an inventory for Ontario chiropractors.

## Methods

### Study design

The design consisted of a cross-sectional self-report web-based survey of Ontario chiropractors.

### Sampling frame

Eligible participants consisted of Ontario chiropractors who were in active practice and who had prescribed home exercises at least once in the 30 days prior to completing the survey and who were either members of the Ontario Chiropractic Association (OCA), chiropractors on the Canadian Memorial Chiropractic College (CMCC) Continuing Education mailing list and/or had his/her e-mail listed on an online business directory in the Spring of 2004. We were interested in capturing the opinions of “active” practitioners” (i.e., those who were working full-

time, part-time, and/or were semi-retired), because we judged that treating fewer than one patient per week would likely not enable most DCs to adequately maintain their skill levels. Similarly, with regards to the inclusion criterion of “prescribing exercise at least once in the last 30 days,” we judged that if a respondent had to draw on a recall period of > 30 days, then the accuracy of his/her responses was likely to become unacceptably compromised.

### Sample characteristics

Chiropractors who were currently practicing in Ontario with an e-mail address listed on <http://on.finditincanada.ca> and/or [www.canada411.ca](http://www.canada411.ca) were contacted. These websites are online business directories obtained from publicly available telephone records from several participating providers (e.g. Bell Canada). Chiropractors who opt for “online advertising” in addition to their free listing have the option of including their e-mail address on the online directory. Of the chiropractors who were listed as practicing in Ontario, 36 had e-mail addresses listed in <http://on.finditincanada.ca> and 100 were listed in [www.canada411.ca](http://www.canada411.ca). Also, 3,200 chiropractors on the CMCC Continuing Education mailing list were sent a letter inviting them to complete in the survey. Finally, another invitation to participate in the study was included in the Spring 2004 edition of the OCA Newsletter, which was sent to 2,517 (1,341 by e-mail, 1,176 by surface mail) chiropractors.

### Sample size

The correct method for estimating the required sample size for this type of study was not as straight forward as we would have liked. This is because our study objective was one which would also have lent itself to a qualitative semi-structured interview design; therefore, we compared quantitative and qualitative sample size estimates. First, we performed the type of conservative sample size estimate which would typically be used if proportionate representativeness for a maximally variable target population were desired: using a target population size of  $N = 2,517$ , 95% confidence, a 5% confidence interval width and 50% variability, revealed that a minimum of  $n = 320$  respondents would be required. In order to achieve 320 usable responses with a 20% non-response rate, we calculated that the survey would theoretically have to be

sent to at least 400 chiropractors within the target population of 2,517 Ontario chiropractors. We then compared this against the sample size typically used in qualitative semi-structured interview type of designs, because it was not our intention to necessarily be able to assign precise percentages to each response option, so much as it was to compile a complete list of all those strategies perceived by chiropractors as helpful in maximizing patients' home exercise compliance. According to Kvale,<sup>33</sup> 5–25 interviews would typically need to be conducted in order to reach a point of saturation where further interviews yield little new knowledge. Clearly there is a large discrepancy between the 2 estimates, but because our objective is more qualitative than quantitative, we judged a response rate of  $\geq 25$  to adequately meet our requirements.

#### *Sample recruitment*

Inclusion criteria consisted of actively (treating, on average, at least one patient per week) practicing in Ontario, a Canadian province, and prescribing home exercises at least once 30 days prior to completing the survey. We were interested in capturing the opinions of "active" practitioners" (i.e., those who were working full-time, part-time, and/or were semi-retired). The consensus among the authors and the 4 clinicians who reviewed the survey, was that treating fewer than one patient per week would capture chiropractors who might otherwise not categorize themselves as "active" (such as the part-time or semi-retired practitioner). Similarly, with regards to the inclusion criterion of "prescribing exercise at least once in the last 30 days," the consensus was that if a respondent had to draw on a recall period of  $> 30$  days, then the accuracy of his/her responses was likely to become potentially unacceptably compromised. We used *systematic sampling* because this has been shown to yield acceptably similar (i.e., "representative") results to random sampling, when the sample size is  $n > 300$ .<sup>34</sup> In addition, in our judgment, the sampling frame covered the majority of practicing chiropractors in Ontario, since OCA members represented approximately 78% of Ontario's practicing chiropractors in the Spring of 2004.

There were 3 phases of recruitment utilized in this study:

PHASE 1 involved a preliminary e-mail detailing the purpose and objectives of this project and approximately

how many minutes it would take to complete the survey; this was sent to 136 chiropractors practicing in Ontario listed with an e-mail address on <http://on.finditincanada.ca> and/or [www.canada411.ca](http://www.canada411.ca). This e-mail included a clickable link to a web page that further described the study and contained another clickable link to the survey. A 2nd e-mail was sent 2 weeks later as a reminder.

PHASE 2 of recruitment involved a paper version of the e-mail inviting the chiropractor to access the study's link and was sent to the 3,200 chiropractors on the CMCC Continuing Education mailing list.

PHASE 3 was conducted several weeks later via the OCA Spring 2004 Newsletter, which was surface-mailed or e-mailed to Ontario chiropractors, which included the invitation to participate in the study.

Kaye and Johnson<sup>35</sup> reported on the issues related to online research and provided recommendations which were incorporated into our online research. They noted that when Penkoff *et al.*, as cited in Kaye and Johnson,<sup>35</sup> sent potential respondents an unannounced and unsolicited e-mail survey, that the researchers received an overwhelming number of hostile comments from those who were sent the survey. In contrast, Anderson and Gansneder<sup>36</sup> initially e-mailed their potential respondents with letters of request and only e-mailed surveys to those that agreed to participate; as a result, the authors did not experience the same negative comments as Penkoff *et al.*<sup>35</sup> Dillman, as cited in Hawk *et al.*,<sup>37</sup> noted that individually addressing cover letters with the doctor's name also increased survey response rates.<sup>37</sup> Although this was a consideration, it would have been an unfeasibly time intensive task in our study, given the size of the sampling frame.

To avoid "spamming" the sample, only one reminder to complete the survey was e-mailed. "Spamming," in this case, refers to the mass mailing of unrequested and nearly-identical e-mail messages.<sup>38</sup>

#### *Questionnaire development*

##### *Item generation*

Literature on other surveys of health care practitioners was reviewed to assess whether any relevant studies had already developed survey instruments including items re-

lating to exercise prescription and compliance to home based exercise. None of the existing surveys were found to adequately cover the issues we wished to investigate, so a new instrument was developed.<sup>2,37,39-46</sup>

The new prototype questionnaire was directed at chiropractors, and aimed to gain insight into the strategies most commonly used by practicing Ontario chiropractors to maximize patient compliance to home exercise prescription. There were questions/items relating to how frequently home exercise was prescribed, what proportion of patients comply with the exercise prescription, characteristics of those patients who were likely and unlikely to comply, and finally, strategies used to maximize compliance. The questionnaire also asked respondents for general demographic information such as age, sex, number of patients seen in a regular workweek and year graduated from chiropractic college (Tables 1 and 2).

Four response option formats were utilized in the questionnaire; the respondents were required to either:

- 1 Click on “yes” or “no;”
- 2 Click on a text box and type in the answer to an open-ended question;
- 3 Click on a 5 point Likert-type scale, which permitted a range of responses from “always” to “never;” or
- 4 Click on a radio-button from a list of several closed-ended response options. If the respondent’s desired answer was not included in the option list provided, open-ended responses could be typed into a text-box provided.

Once this prototype was developed, a sample of 4 practicing CMCC faculty were asked, individually via e-mail to assess the content validity and comprehensibility of the list of items and their response options; they were also asked to add any items and response options they feel should be included but were missing. We used a convenience sample of individuals who were qualified to participate on the basis of their having the same inclusion criteria as our target population. Appropriate revisions were made to the survey according to the clinicians’ recommendations.

#### *Final questionnaire pre-tests*

A qualitative (more clinimetric, as opposed to psychometric) pre-test was performed on the final questionnaire draft, in that it was piloted on 4 practicing chiropractors. They were asked to provide feedback, Delphi Technique style, on the comprehensibility (wording and layout), relevance, and respondent burden of the items. Psychometric testing (quantitatively assessed reliability and validity) is generally accepted to be more important for clinically evaluative instruments, than for more qualitatively-oriented subjective types of questionnaires like ours.<sup>47</sup> The latter should, however, be subjected to qualitative pre-testing involving content-validity and face-validity testing. The latter generally includes assessments for comprehensibility, sensibility, acceptability of respondent-burden, and a pleasing, uncluttered, professional-looking appearance.<sup>47</sup> We feel our questionnaire was subjected to qualitative pre-testing of comparable – if not superior – rigor as most comparable instruments in the literature.

‘Dry run’ tests were conducted to measure the average length of time it took to complete the survey. The approximate number of minutes needed to complete the survey was between 10–15 minutes. This information was disclosed on the request for permission e-mail and on the survey itself.

#### *Questionnaire administration*

The e-mail medium was chosen because there are several advantages to online surveys compared to mail and telephone surveys. Traditional mail surveys of medical and health professionals tend to be characterized by low response rates.<sup>41</sup> On the other hand, an online survey of UK medical doctors had a 94% response rate.<sup>48</sup> It is important to note, however, that these participants were offered financial incentives to complete the questionnaire, and compliance is also somewhat dependent on how interesting respondents generally find the survey topic. There are several other advantages to online surveys: 1) they are relatively inexpensive; 2) researchers obtain the data almost immediately; 3) data can be automatically entered into statistical analysis software; 4) completing and sending the survey online is generally easy for the computer-literate respondent (most healthcare providers < 70 years of age currently *are*); and 5) web-based surveys can easily preserve respondent anonymity.<sup>49</sup>

Table 1  
Demographics of sample of Ontario chiropractors (n = 104)

	<i>Response Option</i>	<i>Frequency/Proportion of Respondents (%)</i>
<i>Gender</i>	Male	69 (65.7%)
	Female	35 (33.3)
<i>Age (yrs)</i>	< 35	56 (53.3)
	35–44	30 (28.8)
	45–54	16 (15.2)
	55–65	3 (2.9)
	> 65	0 (0)
<i>Years in practice (n = 104)</i>	< 2	26 (24.8)
	2–10	41 (39)
	11–20	25 (23.8)
	21–30	10 (9.5)
	> 30	2 (1.9)
<i>Year graduated from chiropractic college</i>	Median	1997
	Range	1964/2003
<i>Chiropractic college attended</i>	CMCC	85 (81)
	National University of Health Sciences (formerly NCC)	6 (5.7)
	NYCC	3 (2.9)
	Palmer – West	3 (2.9)
	Parker	1 (0.1)
	Anglo-European Chiropractic College (UK)	1 (0.1)
	Logan College of Chiropractic	1 (0.1)
	Western States	1 (0.1)
	Life University	1 (0.1)
	Not entered/undecipherable	2 (1.9)
<i>Patient visits per week (n = 104)</i>	< 50	23 (21.9)
	50–100	36 (34.3)
	101–149	15 (14.3)
	150–200	17 (16.2)
	> 200	14 (13.3)
<i>Avg # hours in practice per week (n = 104)</i>	< 35	64 (61)
	35–45	30 (28.6)
	> 45	10 (9.5)

Table 2  
Comparison of demographics with other surveys on Ontario<sup>52</sup> and Canadian<sup>59</sup> chiropractors.

	Ainsworth & Hagino	Waalén & Mior <sup>52</sup>	Kopansky-Giles & Papadopoulos <sup>59</sup>
CMCC graduates	81%	83%	75%
Male	65%	76%	83%
Female	35%	24%	17%
Years in practice < 20 years	84%	73%	–
Mean number of years in practice	–	13.4 yrs	13.7 yrs

One of the major disadvantages to online surveys is that the respondents may not be representative of the population of interest.<sup>49</sup> A National Geographic Society Study (1999) reported that U.S. respondents to online surveys tended to be middle aged or younger, white, and more highly educated.<sup>50</sup> Our goal was to obtain data that was representative of Ontario chiropractors, and the demographic data collected on participants was used to try and confirm their representativeness (Table 2).

To address the possibility that using an online survey might bias the sample by excluding those potential respondents without access to the Internet, we consulted with 2 CMCC staff members who regularly correspond with CMCC, and in their estimation, most *practicing* chiropractors in Canada > 44 years of age currently *do* use email and have at least some basic familiarity with accessing the Internet; therefore, in our judgment, any lack of response-compliance demonstrated by our sample was not likely to be due to a *survey accessibility-bias* which could significantly alter the findings. In addition, since it was not the purpose of the study to obtain precisely proportionate field-practitioner representation so much as it was to obtain a complete list of perceived compliance-maximizing strategies, we have no reason to believe that the relatively few practitioners without routine access to the Internet would have contributed strategies not mentioned by those who *do* have access.

Other disadvantages to online surveys include technical problems such as: 1) computer “crashes” or browser

“freezes;” 2) researchers not obtaining all the completed surveys if there is an electronic transmission interruption and; 3) multiple entries where a respondent can complete and submit the survey more than once.<sup>35,49</sup>

According to Kaye and Johnson,<sup>35</sup> to help ensure that only the intended sample complete and return the questionnaire and not Internet users who happen to find the survey site by chance, investigators should incorporate the use of passwords and clearly state the survey’s intended audience on the survey website; but because the survey was located directly on the CMCC website, we felt we could minimize these kinds of sampling errors without the use of passwords. A description of the intended participants was visibly placed at the top of the website in order to additionally minimize sampling errors.

Once the respondent completed the survey, s/he submitted the survey by clicking on a “send survey” button. Immediately after the survey was sent, another message appeared on the respondent’s screen confirming that the survey had been returned to the researchers and thanked him/her for taking the time to complete the questionnaire.

The technical aspects of conducting an online survey, including web page design, data entry and other online features such as the “send survey” submit button described above were handled by the CMCC Management Information Systems department.

### Ethics

#### Confidentiality

Confidentiality was not an issue because e-mail addresses were entered in the blind carbon copy (BCC) address bar and the subjects completed and submitted the questionnaire from a website URL. This method eliminated the need for the respondent to e-mail his/her completed questionnaire, thereby preserving respondent anonymity.

#### Informed consent

The introductory web page outlined who the target audience was intended to be, the types of questions to be asked, the goals of the survey, the potential risks and benefits to the participant, contact information, and a section that read: "If you agree to take part, click on the button below. By submitting the survey, you are consenting to take part." Therefore, as indicated by Portney and Watkins,<sup>51</sup> the initial mailing informed eligible respondents about the study, and their completion of the survey effectively comprised their "written informed consent." The

study was reviewed and approved by the CMCC Institutional Review Board.

#### Analysis

Statistical analysis of the questionnaire data was performed using mainly frequency counts and 95% confidence intervals of response option endorsements to the questions relating to strategies used to maximize compliance. The survey data were automatically imported into an Excel database/spreadsheet where the frequency counts and confidence interval computations were performed.

#### Results

##### Response rate

Of the 136 chiropractors initially listed with e-mail addresses on [www.canada411.ca](http://www.canada411.ca) and/or <http://finditincanada.ca>, 39 were returned as undeliverable ("Mail delivery failed: returning message to sender"). The invitation letters that were included as inserts in the CMCC Continu-

Table 3  
Chiropractors' opinions on home exercise (n = 104)

	Response Option	Frequency Count (%)
Importance of home exercise	Strongly Agree	78 (74.3)
	Agree	26 (24.8)
	Neutral	1 (0.9)
	Disagree	0 (0)
	Strongly Disagree	0 (0)
Purpose of home exercise	Aerobic conditioning	43 (41)
	Flexibility	95 (90.5)
	Strengthening	102 (97.1)
	Other	36 (34.3)
Proportion of patients given home exercise	< 25%	2 (1.9)
	25–50%	11 (10.5)
	51–75%	30 (28.6)
	> 75%	60 (57.1)



ing Education surface mail-out were sent to 3200 chiropractors. The Spring 2004 edition of the OCA newsletter was sent to 2517 chiropractors (1341 by e-mail, 1176 by surface mail). There were a total of 104 respondents to the survey.

*Demographics*

The majority (81%) of the responding chiropractors were CMCC graduates (Table 1). The demographics of our sample were similar to Waalen and Mior’s 2001 sample of Ontario chiropractors<sup>52</sup> which consisted of 76% males, 83% CMCC graduates, and a majority (over 60%) who were in practice for less than 20 years (Table 2).

*Exercise in general*

Table 3 summarizes the respondents’ answers to ques-

tions on exercise in general. To the statement, “Home exercise is an important part of chiropractic care” 74% “strongly agreed,” 25% “agreed;” therefore, 99% agreed with the concept of prescribing home exercise, and no one disagreed with it. The majority felt the purpose of home exercise was for strengthening (97.1%) and flexibility (90.5%). Fifty-seven percent of the respondents prescribed home exercise to more than 75% of their patients.

*Exercise compliance of patients*

Tables 4 and 5 summarize the respondents’ answers to questions on exercise compliance. One-third (34.3%) felt that 25–50% of their patients were compliant to home exercise recommendations where another 1/3 of respondents felt that 51–75% of their patients were compliant.

Table 4  
Chiropractors’ opinions on home exercise compliance (n = 104)

Survey Question	Response Option	Frequency Count (%)
Proportion of patients complaint to home exercise?	< 25%	22 (21)
	25–50%	36 (34.3)
	51–75%	41 (39)
	> 75%	5 (4.8)
How measure compliance?	Questionnaires	4 (3.8)
	Verbal feedback from patient	104 (100)
	Does not take SPECIFIC steps to measure compliance	6 (5.7)
	Other <sup>1</sup>	39 (37.1)
	Ask patients to demonstrate exercises given	18 (28.6%)
Top 5 reasons why patients are NON-compliant <sup>2</sup>	The patient feels s/he doesn’t have enough time and/or is too busy	96 (91.4)
	The patient keeps forgetting to do them	89 (84.8)
	The patient is in too much pain/the exercises make the pain worse	32 (30.5)
	The patient finds performing the exercises too boring	18 (17.1)
	Other* no consensus	17 (16.2)

<sup>1</sup> No clear respondent consensus on answers submitted as “other”

Table 5  
Chiropractors' opinions on the top 5 patient characteristics of compliers versus non-compliers (n = 104)<sup>3</sup>

Level of Compliance	Response Option	Frequency Count (%)
Compliers	High level of motivation	102 (97.1%)
	High level of self-esteem	88 (83.8)
	"Fit" level of fitness	80 (76.2)
	Experience with exercise	77 (73.3)
	"High" level of pain tolerance	66 (62.9)
Non-Compliers	Low level of motivation	96 (91.4)
	"Sedentary" level of fitness	84 (80)
	"Low" level of pain tolerance	81 (77.1)
	Low level of self-esteem	77 (73.3)
	Inexperience with exercise	73 (69.5)

The majority (99%) of chiropractic respondents measure compliance with "verbal feedback from patient."

When asked "what are the most common reasons cited by patients for NOT performing prescribed exercises?" 91.4% felt that "the patient feels s/he doesn't have time and/or is too busy" and 84.8% felt that "the patient keeps forgetting to do them." Most respondents felt that a high level of motivation (97%), high level of self-esteem (83%), high level of fitness (76%), experience with exercise (73%) and high level of pain tolerance (63%) predicted good compliance with home exercise. Conversely, respondents felt that a low level of motivation (91%), sedentary level of fitness (80%), low level of pain tolerance (77%), low level of self-esteem (73%) and inexperience with exercise (69%) predicted poor compliance to home exercise.

#### *Strategies used to maximize compliance*

Table 6 summarizes the top 5 strategies most frequently used by respondents to maximize compliance to home exercise. That is, the respondent replied that s/he "always" used the specified strategy. When asked to "Rate how often you use the specified strategy to maximize your patients' compliance to prescribed home-based exercise," the majority (82%, 95% CI = [75–90%]) reported motivating patients by keeping exercise instructions simple and by explaining the exercises in a positive and enthusi-

astic manner (81%, 95% CI = [74–89%]). Most respondents (80%, 95% CI = [72–88%]) reported giving patients' encouragement, support and praise to improve compliance. Prescribing exercises that require low-cost equipment such as a gym ball (70%, 95% CI = [61–78%]), supplying patients with material to help demonstrate specific exercises (62%, 95% CI = [53–71%]) and educating patients by discussing the importance of and benefits to exercise (62%, 95% CI = [53–71%]) were also common strategies used by respondents. Conversely, when asked to rate how often the respondent "tries to encourage the patient to fill out a daily exercise log," 84% (95% CI = 77–91%) reported "never" or "seldom" using this strategy.

#### *Discussion*

Ninety-seven percent of Ontario chiropractors surveyed by the National Board of Chiropractic Examiners (NBCE) reported using therapeutic exercise;<sup>3</sup> accordingly, 99% of respondents in our survey felt home exercise was "an important part of chiropractic care." This study sought to gain insight into strategies used by Ontario chiropractors to maximize patient compliance to home exercise and the results suggest that there is near-consensus in terms of the strategies used most frequently by respondents.

Milroy and O'Neil<sup>6</sup> emphasized the importance of identifying individual barriers to chiropractic prescribed

Table 6

Chiropractors' opinions on the top 5 strategies most frequently used to maximize compliance to home exercise (n = 104)

Strategies to Maximize Compliance	Frequency Count (%)	Confidence Intervals
I try to keep the instructions simple (e.g. "1 set of 10, every day")	86 (81.9%)	74.5 – 89.3%
I try to motivate my patients by explaining the exercises in a positive and enthusiastic manner	85 (81)	73.5 – 88.5%
I give the patient encouragement, support and praise	84 (80)	72.3 – 87.7%
I try to prescribe exercises that require low-cost equipment such as a gym ball, weights, elastic bands, etc.	73 (69.5)	60.6 – 78.4%
I supply to patient with material that helps demonstrate specific exercises (e.g. Illustrations, videotapes, etc.)	65 (61.9)	52.6 – 71.2%
I try to educate my patients by taking the time to discuss the importance of and benefits to exercise	65 (61.9)	52.6 – 71.2%

home exercise. In our survey, 54% of respondents reported "sometimes" and 19% reported "always" helping patients develop problem-solving strategies for handling interfering factors/barriers to exercise. Milroy and O'Neil contended that "motivation" was a key factor in managing compliance. Survey respondents agreed in that 97% felt that a "high" level of motivation predicted compliance and conversely, 91% felt that a "low" level of motivation predicted non-compliance. Agreeing with Merritt's<sup>7</sup> recommendations, 70% (95% CI = 60.6–78.4) "always" prescribed exercises that require low-cost equipment "such as a gym ball, weights, elastic bands, etc." to maximize compliance to home exercise. This suggested that some of the strategies recommended in the literature are also valued by current practitioners.

Christensen<sup>5,10</sup> suggested that practitioners frequently (i.e., at every visit) follow-up on whether or not the patient is performing the prescribed home exercise. In our study 49% of respondents reported "sometimes" and 33% reported "always" asking the patient every time s/he visited the office, whether or not s/he performed the exercises. Christensen also asserted that graduated progression and prescribing fewer exercises would improve patient compliance. Our survey respondents' practices somewhat reflected Christensen's advice in that 35% of respondents reported "sometimes," and 57% reported "always" using graduated progression; 34% reported "sometimes" and 57% reported "always" prescribing

fewer exercise in an effort to improve compliance. Christensen also suggested that chiropractors demonstrate exercises and follow-up with patients on subsequent visits. Again, respondents' practices somewhat reflected Christensen's advice: 35% of respondents "sometimes" and 56% reported "always" demonstrating the exercises to their patients and immediately asking the patient to demonstrate them back. Fifty-one percent of respondents reported "sometimes" and 31% "always" reported having the patient perform the exercise while the chiropractor demonstrates. Forty-eight percent of respondents reported "sometimes" and 30% reported "always" asking the patient to perform the exercises on subsequent visits.

Christensen<sup>9</sup> also encouraged both chiropractors, and their *staff*, to praise and acknowledge their patients' home exercise performance, in an effort to motivate patients to comply. Only 40% of respondents reported "sometimes" and 25% reported "always" having their *office staff* offer the patient encouragement, support and praise. When asked to rate their usage of the strategy "I give my patients encouragement, support and praise to improve compliance," 18% of respondents reported "sometimes" and 80% "always" reported using this approach. There was stronger agreement with Christensen's advice to keep instructions simple in that 16% of respondents reported "sometimes" and 82% reported "always" using this strategy to maximize compliance. In contrast to Christensen's suggestion for patients to use an

exercise log, 84% reported “never” or “seldom” using this strategy. In our opinion, perhaps practitioners have found that daily exercise logs were too burdensome for patients or that patients’ exercise logs did not accurately reflect the patients’ *actual* exercise performance anyhow.

Finally, Schneiders *et al.*<sup>32</sup> observed that when patients with acute or sub-acute low back pain were given written and illustrated exercise instructions, compliance improved when compared to patients who received only verbal instructions. In our survey, 25% of respondents reported “sometimes” and 62% reported “always” supplying patients with material to demonstrate exercise (e.g. illustrations or videotapes) with the aim of maximizing compliance.

It is important to note, however, that respondents reporting *using* these strategies, and actually *agreeing to* and/or *valuing* these strategies, are 2 different issues – any discrepancy may simply be an issue of time, feasibility, and/or implementation knowledge.

#### *Reasons for patient non-compliance*

The majority of respondents felt that patients’ lack of time and/or being “too busy” (91%) and simply forgetting to perform home exercise (85%) were the main reasons for non-compliance. The level to which patients’ viewpoints actually agree with those of respondents warrants further investigation. Furthermore, insight into how patients feel these barriers can be overcome would also be valuable knowledge.

#### *Chiropractors’ strategies and compliance*

Despite the fact that there appeared to be respondent consensus in terms of strategies most frequently used to maximize compliance to home exercise, the *effectiveness* of the strategies has yet to be determined. In our opinion, it appeared that the top 5 compliance strategies that Ontario chiropractors were using centred on communication; they consisted not only of communicating the importance of exercise, but also in communicating the information in a way that was *understandable* to the patient. So, if there is an underlying “communication” theme when it comes to compliance strategies, perhaps simply asking the patient to repeat, in his/her own words, what the doctor explained regarding the home exercise program, would be useful. This theme was not surprising given that it is generally believed that communication is

key in the doctor-patient relationship; and that solid rapport with the patient is not only related to improved patient compliance, but also, improved patient and doctor satisfaction, improved health outcomes, and better-informed health decisions.<sup>53</sup>

The literature suggested that chiropractors’ practice behaviours can be reasonably predicted by his/her chiropractic educational experience,<sup>54,55</sup> and that exercise therapy is included in the formal education of chiropractors,<sup>56,57</sup> which probably explains the high utilization rate of exercise as an adjunct to chiropractic care. It follows that including *compliance strategies* as part of chiropractors’ formal training might lead to improved therapeutic outcomes as they relate to home exercise; but research on the correlation between education (content, mode of delivery) at chiropractic college and utilization of compliance strategies has yet to be explored.

Generally speaking, compiling an inventory of the strategies chiropractors used to maximize exercise compliance is a prudent starting point for focusing and developing further research on the most effective strategies used by chiropractors to maximize exercise compliance. The rationale for the latter statement is that strategies that chiropractors *actually* use will of course fit their belief systems. There is little point in demonstrating the effectiveness of strategies that practitioners refuse to use; therefore, it could be argued that compiling a practical inventory of strategies, which presumably fit chiropractic belief systems, will provide a realistic pool of options to focus effectiveness-oriented research on.

#### *Patient characteristics and compliance*

Because there appeared to be respondent consensus on the patient characteristics that related to compliance and non-compliance to home exercise, the implication of these findings deserved discussion. Most (97%) of respondents felt that a “high” level of motivation and “high” level of self-esteem (84%) were related to compliance. In contrast, 91% felt that “low” level of motivation and “sedentary” level of fitness (80%) related to non-compliance. Given this insight, perhaps the identification of these patient characteristics would help chiropractors categorize their patients as “likely to comply” and “unlikely to comply.” We believe this “categorization” to be relevant because it appeared that the preferred strategies of responding chiropractors to maximize com-

pliance tended to require the least amount of time when compared to less-preferred strategies (e.g. keeping instructions simple versus developing problem-solving strategies to overcome individual barriers).

Perhaps this supports our belief that time-intensive interaction between chiropractor and patient has serious feasibility issues and that approaches to maximizing compliance ought not to be time consuming. As such, perhaps the less time consuming strategies used by chiropractors are appropriate for those patients "likely to comply" to home exercise. For those patients categorized as "unlikely to comply," perhaps the chiropractor might then consider more individualized (problem-solving given a patient's own unique barriers to exercise) strategies. Although more time-consuming, knowing that this strategy is reserved for only those "unlikely to comply," chiropractors might take the time to use this approach if indicated. Dionne et al.<sup>58</sup> developed and showed the accuracy of a clinical prediction rule that identified a large portion of workers with back pain at lower risk of adverse occupational outcomes. The authors suggested that this tool might help primary care physicians in deciding who should receive early specialized intervention and those in whom intervention would be unnecessary, costly and time-consuming. Along these lines and using our data as a starting point, perhaps the development of a similar clinical prediction tool for early identification of patients "unlikely to comply" would be useful for chiropractors. Still other chiropractors might consider this beyond the scope of his/her practice and choose to refer these patients to personal trainers or kinesiologists for example, who could give the patient individual attention.

#### Limitations

It is uncertain whether the respondents were representative of Ontario chiropractors; however, for the following reason, we believe the respondents in our study were reasonably representative of Ontario chiropractors: as shown in Table 2, the demographic profile of our sample is similar to those profiles in Waalen and Mior's 2001 survey of Ontario DCs,<sup>52</sup> and Kopansky-Giles and Papadopoulos' 1997 cross-Canada survey.<sup>59</sup> Nonetheless, the present study's low response rate suggested that a response bias may have existed and warranted further discussion. We propose 3 reasons to explain the low response rate: 1) chiropractic practitioners are frequently bombarded with

requests to respond to surveys by their alumni, professional associations, and commercial enterprises, and their goodwill to absorb this influx has likely become super-saturated; 2) bearing the first point in mind, and for the reasons described in the methods section under "questionnaire administration," we elected to administer only one "mailing;" and 3) surface mail recruitment required respondents to go to another (electronic) medium to complete the survey, and this transition, and the subsequent delay, may have resulted in potential respondents forgetting to access the survey URL. There were negligible differences between early data ( $n = 63$ ) and the data collected and analyzed for this report ( $n = 104$ ) with respect to demographics, chiropractors' opinions on home exercise, exercise compliance, the top 5 patient characteristics of compliers versus non-compliers, and the top 5 strategies most frequently used to maximize compliance. The consistency between data analyzed with 63 and 104 respondents suggested that the results would likely remain consistent with more respondents. Still, unlike in epidemiological studies where respondent representativeness is crucial, this study is more concerned with what qualified, licensed chiropractors are doing, with no particular need to be proportionately representative of the full spectrum of all types of chiropractors.

It was our original intent to use the 1,256 members listed in the Canadian Chiropractic Association Membership Directory and Buyer's Guide 2002, which listed e-mail addresses of the majority of DCs practicing in Ontario, as our sampling frame. This sampling frame would have represented 58% of the DCs listed as practicing in Ontario (with and without e-mail addresses). We opted to contact potential participants via e-mail for the feasibility reasons cited in the Methods section above; however, with the new "Personal Information Protection and Electronic Document Act" implemented in January 2004, we were unable to utilize this method. Because of this methodological problem, we had to incorporate the usage of traditional surface mail. Because the chiropractors contacted via traditional surface mail were required to take the time to type in the 34 character-long website URL instead of simply "clicking" on a link to the web-survey, perhaps those chiropractors, who would otherwise be interested in the study, found this process too time consuming.

Of the 136 e-mail addresses we were able to utilize (because they were listed on public online business direc-

tories), 39 were returned as undeliverable. Of the 1341 e-newsletters sent by the OCA with information regarding our study, we were unable to obtain information on how many e-mails were undeliverable.

### Recommendations

Clearly, more research on home exercise compliance is needed. In our opinion, this inventory of chiropractors' opinions on exercise prescription and patients' compliance to them can be used as a starting point for focusing further research in the area, including: 1) the effectiveness of the preferred strategies; 2) the utility of improving DC educational qualifications to address non-compliance; and, 3) the correlation between formal training on patient compliance issues and the clinical use of compliance strategies.

### Conclusion

The top 5 strategies used most frequently by Ontario chiropractors' to maximize compliance to home exercise were: keeping instructions simple (82%); motivating patients by explaining exercises in a *positive and enthusiastic manner* (81%); giving patients' encouragement, support and praise (80%); prescribing exercises that require low-cost equipment (70%); and supplying patients with material that helps demonstrate the exercises (62%) and educating patients by discussing the importance of and benefits to exercise (62%).

While the strategies listed above were heavily favoured by this study's respondents, the low response rate suggests that these findings should be regarded with caution insofar as representativeness of Ontario chiropractors in general is concerned. On the other hand, our study is something of a quantitative-qualitative study hybrid, in that we were aiming to compile a complete list of currently-used strategies and rank-categorize them to the extent that we could determine which strategies tend to be the most popular. This is not to suggest that "most popular" is synonymous with "most effective;" however, knowing which strategies are used *most* helps to prioritize the allocation of research funds when trying to decide which strategies to subject to effectiveness-testing *first*. To this end, we believe our sample size was adequate for our purpose.

### Acknowledgements

We would like to thank and acknowledge the help of Stephen Injeyan, PhD, DC, Brian Schut, DC, Igor Steiman, MSc, DC and Oryst Swyszcz, DC on the development of the questionnaire and Deron Douglas for addressing the technical aspects of the e-survey. Finally, a very special thank you to Cam McDermaid, DC for his generous assistance in survey editing, in writing the HTML version of the electronic survey and help with participant recruitment.

Funding for this project was provided by the Ontario Chiropractic Association.

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