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Brief Report

Enhancing health care professionals' and trainees' knowledge of physical activity guidelines for adults with and without SCI

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Background: Health care providers (HCPs) are preferred sources of physical activity (PA) information; however, minimal research has explored HCPs' knowledge of spinal cord injury (SCI) PA guidelines, and no research has examined HCP trainees' PA guideline knowledge.
Objective: The current study explored HCPs' and trainees' initial knowledge of PA guidelines for both adults with SCI and the general population, and the utility of an event-based intervention for improving this knowledge.
Methods: Participants (HCPs $n = 129$; trainees $n = 573$) reported guideline knowledge for both sets of guidelines (SCI and general population) immediately after, one-month, and six-months following the intervention. Frequencies determined guideline knowledge at each timepoint, while chi-squared tests examined differences in knowledge of both guidelines, as well as knowledge differences in the short- and long-term.
Results: Results demonstrated that HCPs and trainees lack knowledge of PA guidelines, particularly guidelines for adults with SCI. The results further suggest that a single event-based intervention is not effective for improving long-term guideline knowledge.
Conclusion: Suggestions are made for future research with the aim of improving interventions that target HCP and HCP trainees' long-term guideline knowledge for adults with SCI and the general population.

Keywords: Guidelines, Health care providers, Health care trainees, Physical activity, Physical disabilities

Physical activity (PA) guidelines provide evidence-based recommendations for the amount and intensity of PA necessary to achieve health and/or fitness benefits.[1] In addition to Canadian PA guidelines (PAG) advanced for the general adult population,[2] PAG are available for other populations, including adults with a spinal cord injury (SCI)[3] for whom physical inactivity can increase the risk for chronic secondary health complications, injury, and mortality.[4] Despite their wide dissemination, minimal research has examined knowledge of PAGs. Of the research that has been conducted, results suggest that Canadian adults have low knowledge of general adult PAG and fall short of meeting recommendations.[1]

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Only one study has explored knowledge of SCI PAG. Gainforth and colleagues[5] demonstrated the short-term utility of an event for promoting SCI PAG knowledge (i.e., guideline awareness and recall) to SCI support personnel. However, improvements in knowledge were not maintained at one-month follow-up. Thus, there is a need to further determine strategies for improving SCI PAG knowledge, an important first step in promoting PA to adults with SCI.

Different interventions are being explored to determine how to best support PAG knowledge for adults with SCI and the general population.[1] Among the most promising targets for interventions are health care professionals (HCPs) and HCP trainees. Appointments with HCPs present optimal opportunities for promoting PA, as patients respect HCPs and consider HCPs to be their first source for preventative health information and advice.[6,7] However, one major barrier to HCPs' promotion of PA is guideline

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knowledge.[8] Meanwhile, minimal research has aimed to determine trainee knowledge. Before developing interventions, researchers must first determine HCPs' and trainees' initial knowledge of PAGs for adults with SCI and the general population, as well as strategies for improving this knowledge.

One potential type of strategy is continuing medical education (CME). CME is effective for the development and maintenance of HCPs' knowledge, attitudes, and skills, and has been shown to reliably improve HCPs' performance.[9] Given the demonstrated effectiveness of CME interventions, the Canadian Paralympic Committee developed "Changing Minds, Changing Lives" (CMCL). CMCL was a Canada-wide, evidence- and theory-based behavior change intervention delivered to HCPs and trainees in the form of seminar presentations.[10] The presentations (mean duration: 60 minutes) were designed to provide evidence- and theory-based information on PA for individuals with a physical disability including SCI, and demonstrate to HCPs and trainees their important role as influencers in their patients' PA. Participation was voluntary, and information was conveyed verbally by a HCP and a physically active individual with a physical disability, as well as visually using PowerPoint slides. Presentations were tailored to the environment and local context (e.g. supplemental material). Previous evaluations of CMCL demonstrated that attendance increases HCPs' and trainees' intentions to prescribe PA to patients with physical disabilities, including SCI.[10,11] However, the effectiveness of CMCL in improving guideline knowledge has not yet been determined. (For further information regarding CMCL, see references[10,11] or contact the corresponding author.)

CMCL was an innovative intervention that presented an optimal opportunity to meet current gaps in knowledge. Thus, the purpose of this paper was to (1) examine HCPs' and trainees' initial knowledge of PAGs for adults with SCI and the general population, and (2) determine the utility of the CMCL intervention for improving this knowledge. For the first objective, it was hypothesized that initial knowledge of both PAGs would be low but that knowledge of SCI guidelines would be lower than knowledge of guidelines for the general population. For the second objective, in line with previous interventions,[5] it was hypothesized that CMCL would improve knowledge of both PAGs in the short-term but not in the long-term (i.e., one- and six-months post-intervention).

Methods

Previous reports have documented CMCL development and implementation[10] and participants' demographics and changes in social cognitions.[10,11] The methods relating specifically to our research question on PAG knowledge, which were not reported in previous papers, are briefly reviewed in this section.

Participants

HCPs and trainees participating in 35 CMCL presentations between 2011 and 2012 were recruited.

Data collection and measures

This study was conducted following approval from the institutional research ethics board of a southern Ontario (Canada) university. Consenting CMCL attendees completed measures assessing knowledge of PAGs for adults with SCI and for the general population, prior to and after CMCL, as well as at one- and six-month follow-up timepoints.

Guideline knowledge

Guideline knowledge was first measured by determining *guideline awareness* by asking participants whether they had heard of PAGs for adults with SCI or the general population (yes/no responses). (E.g. Have you heard of physical activity guidelines for people with a spinal cord injury?) Participants who indicated guideline awareness were then asked to write down the guideline (i.e., *guideline recall*). (E.g. How much physical activity do the spinal cord injury guidelines recommend?) Recall responses were assessed for accuracy and classified as "yes" if the full guideline (i.e., aerobic and strength training recommendations) was accurate, and "no" if incorrect.

Data analyses

Frequencies were calculated for each timepoint to determine the percentage of HCPs and trainees knowledgeable of PAGs. Chi-squared tests were then conducted to determine differences in initial knowledge of SCI and general population guidelines, and any immediate intervention effect or differences in PAG knowledge in the short- and long-term (see Table 1). A Bonferonni correction was used to correct for multiple comparisons of short- and long-term knowledge data (new significance value: $P < 0.0167$). A Bonferonni correction was also used to correct for multiple comparisons of initial guideline knowledge (new significance value: $P < 0.0125$).

Results

Demographic information

A total of 129 HCPs [mean ± age = 32.77 ± 10.42; Male: 24.03%; Female: 75.97%] consented to participate in the study prior to the CMCL

Table 1 Health care professionals' and trainees' physical activity guideline awareness and recall across the four study time points.

	Percentage of participants aware of guidelines and indicating accurate recall (%)				***Immediate effect*** Pre-CMCL & Post-CMCL		***Short-term effect*** Post-CMCL & 1-month follow-up		***Long-term effect*** Post-CMCL & 6-month follow-up	
	Pre % yes/ accurate (Total *n*)	Post % yes/ accurate (Total *n*)	1-month % yes/ accurate (Total *n*)	6-month % yes/ accurate (Total *n*)	X^2 (df, N)	Percent change (%)	X^2 (df, N)	Percent change (%)	X^2 (df, N)	Percent change (%)
Guidelines for Adults with SCI										
Awareness										
HCP	17.80 (*n*=129)	76.80 (*n*=112)	73.70 (*n*=38)	61.50 (*n*=52)	5.19 (1,106)	+59.00	9.50** (1,32)	-3.10	6.62 (1,39)	-15.30
Trainees	8.90 (*n*=573)	62.80 (*n*=538)	77.50 (*n*=182)	51.20 (*n*=170)	13.39* (1, 502)	+53.90	21.35* (1,165)	+14.70	21.14* (1,148)	-11.60
Recall										
HCP	4.30 (*n*=23)	33.70 (*n*=86)	0.00 (*n*=28)	3.10 (*n*=32)	5.84 (4,105)	+29.40	5.14 (2,31)	-33.70	5.28 (4,38)	-30.60
Trainees	15.10 (*n*=53)	25.90 (*n*=340)	2.10 (*n*=141)	6.90 (*n*=87)	22.97* (4,420)	+10.80	13.79 (4,165)	-23.80	3.72 (4,145)	-19.00
Guidelines for General Population										
Awareness										
HCP	73.80 (*n*=130)	86.70 (*n*=113)	88.60 (*n*=35)	86.50 (*n*=52)	24.62* (1,108)	+12.90	4.99 (1,32)	+1.90	.70 (1,38)	-0.20
Trainees	54.50 (*n*=565)	71.30 (*n*=534)	69.90 (*n*=73)	70.00 (*n*=170)	169.87* (1,494)	+16.80	8.84** (1,67)	-1.40	22.93* (1,148)	-1.30
Recall										
HCP	0.00 (*n*=96)	5.10 (*n*=98)	0.00 (*n*=31)	0.00 (*n*=45)	13.10 (4,107)	+5.10	12.80 (4,31)	-5.10	7.80 (4,38)	-5.10
Trainees	1.60 (*n*=309)	7.50 (*n*=385)	3.90 (*n*=51)	0.80 (*n*=119)	38.57* (4,498)	+5.90	20.86* (4,68)	-3.60	16.03** (4,150)	-6.70

Note: Percent frequency of awareness and accurate recall represents the percentage of participants with 'yes' responses to awareness of guidelines and perfect recall of guidelines. Recall was only assessed among participants who provided a 'yes' response to awareness of guidelines. % change: Value indicates percent change in participant awareness or perfect recall of guideline. X^2 and percent change results include listwise deletion procedures for analysis, while frequency values reflect full sample. *P ≤ 0.001; **P < 0.0167 (i.e. P < 0.05 adjusted using Bonferroni correction to account for multiple comparisons). Data collected from intervention delivered in Canada from 2011 to 2012.

presentations. HCPs' most common fields of work were physiotherapy (30.23%), education (11.63%), and medicine (9.30%). Additional common professions for HCPs included occupational therapist, recreation therapist, and nurse.

A total of 573 trainees [mean ± age = 22.10 ± 4.62; Male: 25.48%; Female: 73.47%; sex not specified: 1.05%] agreed to participate. Trainees' most common fields of study included physical education and kinesiology (32.35%) and recreational therapy (17.48%). Additional fields of study for trainees included medicine, nursing, recreation and leisure studies or management, fitness and health studies, education, and general arts and science. (For further HCP and trainee demographic information, see references.[10,11])

Objective #1 – Initial guideline knowledge

Initial knowledge of PAGs

Initial SCI guideline awareness was 17.80% and 8.90% for HCP and trainees respectively, while recall among those who indicated awareness of guidelines was 4.30% for HCPs and 15.10% for trainees. General population guideline awareness was 73.80% for HCPs and 54.50% for trainees; however, recall among those who declared awareness of guidelines was 0% for HCPs and 1.60% for trainees (See Table 1).

Difference in initial knowledge of PAGs

HCPs

There was significantly lower initial awareness of SCI PAGs compared to general PAGs [$X^2(1,1) = 10.02$, P = 0.002]. A chi-square analysis could not be conducted to compare recall as no HCPs accurately recalled the general PAGs prior to the event.

Trainees

There was significantly lower awareness of SCI PAGs compared to general PAGs [$X^2(1,1) = 39.06$, P < 0.001]. There was no difference in recall [$X^2(1,53) = 1.98$, P = 0.16].

Objective #2 – Changes in guideline knowledge over time

Knowledge of PAGs for adults with SCI

HCPs

No significant difference emerged in the percentage of participants indicating guideline awareness from pre-to post-CMCL (P = 0.069) and post-CMCL and six-month timepoints (P = 0.03). However, significant decreases were present between post-CMCL and one-month (P = 0.006). There were no significant differences in guideline recall between pre-CML and post-CMCL (P = 0.636), post-CMCL and one-month (P = 0.231), and post-CMCL and six-months (P = 0.260).

Trainees

Significant differences in guideline awareness were present between all timepoints (Ps < 0.0167). The percentage of participants aware of the guidelines increased significantly from pre-to post-CMCL (P < 0.001), and post-CMCL to the one-month follow-up (P < 0.001), but decreases were present between post-CMCL and six-month follow-up (P < 0.001).

Significant improvements were reported in recall between pre- and post-CMCL (P < 0.001). No significant differences were present between post-CMCL and the one- (P = 0.024) and six- (P = 1.335) month timepoints, though decreases were present.

Knowledge of PAGs for the general population

HCPs

A significant difference was present with a higher percentage of participants indicating guideline awareness post-CMCL compared to pre-CMCL (P < 0.001).

However, significant differences were not present in guideline recall between pre-CMCL and post-CMCL (P = 0.033), as well as the post-CMCL and one- (P = 0.036), and six-month timepoints (P = 0.297).

Trainees

Significant differences in the percentage of participants indicating guideline awareness were present between all timepoints (Ps < 0.0167). The percentage of participants aware of the guidelines significantly increased between pre-and post-CMCL (P < 0.001), but decreased significantly between post-CMCL and the one- (P = 0.009) and six-month (P < 0.001) timepoints.

Significant differences in the percentage of participants demonstrating perfect recall were present between all timepoints (Ps < 0.0167), with significant increases present between pre-and post-CMCL (P < 0.001), and significant decreases between post-CMCL and the one- (P < 0.001) and six-month (P = 0.009) timepoints.

Discussion

The purposes of this study were to (1) examine HCPs' and trainees' initial knowledge of PAGs for adults with SCI and the general population; and (2) determine the utility of an event-based intervention for improving HCPs' and trainees' PAG knowledge. Results generally indicated low initial knowledge of both sets of guidelines, with initial awareness lower for SCI guidelines than general population guidelines. These findings demonstrate an important need to target HCPs and trainees' guideline knowledge, particularly given their position as respected sources of preventive health information.[6,7] With low guideline knowledge, patients are unlikely to be accurately counselled, or indeed receive counselling, on PA. Thus, the findings of the first objective demonstrate a need for a CME intervention, such as CMCL, to target short-term and long-term guideline knowledge.

For the second objective, findings demonstrated an increase in the percentage of individuals indicating knowledge of the guidelines following CMCL attendance, except for knowledge of SCI guidelines among HCPs. Knowledge improvements were often not maintained. While the intervention was rooted in an evidence-based, behavior-change approach[10] — important for producing changes in HCPs' knowledge and practice[6,12] — additional intervention components may be required to sustain knowledge. CME research suggests that multiple sessions (e.g. repeat viewing, further content exposure online) can be more impactful on knowledge outcomes.[9] Accordingly, guideline dissemination interventions should potentially include follow-up media-based interventions to improve retention.[9]

Studies exploring CME and guideline dissemination have also highlighted the importance of interpersonal exchange, specifically interactive approaches to knowledge dissemination.[5, 9] CMCL was delivered using interpersonal channels (i.e. in-person information delivery via HCP presenters).[10] However, while questions were encouraged, no time was allotted to group activity or discussion. As a result, opportunities exist to improve interaction and exchange during the presentation.[13] Group activities could include presentations of case studies for initial small group discussion followed by larger discussions of the case study, guidelines, and behavior change techniques. Furthermore, research on CME effectiveness has noted that online activities may be just as effective as in-person dissemination, and perhaps more preferable due to further opportunities

to customize content and implement different types of interactions.[13] Further investigations could consider implementation of online interpersonal channels and the utility of online delivery for sustaining guideline knowledge.

The strengths of the current study include the large sample of HCPs and trainees from across Canada, the exploration of guidelines for adults with SCI and the general population, and long-term follow-up to examine maintenance of the intervention impact. There are some limitations, particularly participant attrition. This limitation is most noticeable among HCPs. Future interventions must consider ways of maintaining HCPs' long-term study involvement. A second limitation relates to the study timeline and dissemination of SCI PAGs. The guidelines were released in March 2011, just prior to data collection. In the months following CMCL attendance, other SCI PAG dissemination initiatives took place which may have reached participants and impacted knowledge at follow-up time points. Exposure to these guideline dissemination initiatives may potentially explain the greater guideline knowledge reported in certain cases between the one-month and six-month follow-up timepoints. Participants may have also been exposed to other guidelines that emerged during the follow-up time-points.[14] A final limitation is that the study did not control for participants' interest in the guidelines. Individuals more interested in the guidelines may have been more inclined to complete the follow-up assessments, introducing bias to the results.

The current study presents implications for guideline dissemination and implementation. In terms of practice, the findings highlight the importance of continuing to target HCPs' and trainees' knowledge of PAGs. Given low rates of PA participation in Canada,[1,15] as well as the importance of HCPs in disseminating PA knowledge,[6,7] HCPs' and trainees' current low PAG knowledge is of great concern. Of further critical concern is the significantly lower awareness of PAGs for adults with SCI, a population for which PA is necessary for long-term physical and psychosocial health, and the avoidance of potentially severe comorbidities.[3–4,16]

With respect to research, a greater understanding of optimal delivery modes (e.g., online), methods (e.g., interpersonal channels), and frequency (e.g., repeat viewing) should be explored to facilitate the development of more effective guideline interventions that will impact long-term knowledge and PA promotion.

The current study examined HCPs' and trainees' knowledge of PAGs for adults with and without SCI, demonstrating the need for strategies to improve awareness and recall. This research also demonstrated the utility of an evidence-based behavior change intervention event for improving guideline knowledge in the short-term. Further research is necessary to determine effective long-term intervention strategies.

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Conflicts of interest JRT and KAMG were involved in the restructuring of the intervention curriculum. No other conflicts of interest exist.

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