



## Impact of a chronic disease self-management program on healthcare utilization in eastern Ontario, Canada

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### ABSTRACT

This study aims to examine patients' patterns of health care utilization before and after participation in a Chronic Disease Self-Management Program (CDSMP). We conducted a pre-post study using health care administrative data from 186 individuals in the Ottawa region who participated in our CDSMP between September 2009 and January 2011. We collected the number of general practitioner/specialist visits, planned/unplanned emergency department visits, and hospitalizations, measured 6 months and 1 year before and after participation in the CDSMP. Multivariate analysis was performed to identify associations between patient characteristics and pre-post CDSMP health care utilization. CDSMP participation showed no effect on number of physician visits, hospitalizations, or emergency department visits. Individuals with >5 chronic conditions were more likely to visit a physician and the emergency department following the CDSMP than those with 1 chronic condition. Among individuals >61 years of age, those with the marital status widowed were more likely to visit their physician and the emergency department following the CDSMP than married individuals. To conclude, the CDSMP appeared not to decrease health care utilization. Low baseline utilization rates, short-term follow-ups, and a relatively healthy patient population may have contributed to the program's low impact.

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### Introduction

Chronic diseases are responsible for 60% of deaths annually (World Health Organization, 2014). In Canada, 72% of men and 78% of women over age 55 have at least one chronic condition (Moore, 1999). Disease management models such as the Chronic Care Model (CCM) have emerged to enhance the quality of care and control healthcare costs (Lemmens et al., 2008; Wagner et al., 1996; Bodenheimer et al., 2002). According to the CCM, one of the essential elements of high quality chronic disease care is self-management, defined as “the individual's ability to manage the symptoms, treatment, physical and psychosocial consequences and lifestyle changes inherent in living with a chronic condition” (Barlow et al., 2002). Unfortunately, many individuals with chronic disease struggle to achieve optimal self-management. Self-management courses have been developed to help empower

participants by increasing their confidence, teaching them self-management skills, and improving their interactions with the health care system (Newman et al., 2004; Griffiths et al., 2007). One such program is the Chronic Disease Self-Management Program (CDSMP), developed by Stanford Medical School Patient Education Research Centre (Stanford School of Medicine, 2014). CDSMP has been found to improve self-efficacy, health behaviors, and psychological health status for people living with chronic diseases (Brady et al., 2013). Participants attend a workshop consisting of 6 two-and-a-half hour sessions, held weekly and facilitated by two trained leaders. The leaders can be health care providers or peers. Many regions across the globe have adopted CDSMP or related models (Griffiths et al., 2007; Harvey et al., 2008; Lorig et al., 2005), and health care planners have expressed interest in the program's potential to improve health outcomes, reduce health care use, and lower costs (Griffiths et al., 2007; Kennedy et al., 2007).

In 2009, a CDSMP was established in the Champlain Local Health Integration Network (LHIN), a health administrative region in Eastern Ontario comprising Ottawa and the surrounding area (Liddy et al., 2013). In theory, self-management is linked to lower demand for services by raising patients' confidence and awareness, allowing them to better manage their chronic conditions without using additional health

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services (Gately et al., 2007). Reductions in health care utilization following self-management courses were found in several US-based studies using data from self-reported utilization measures (Brady et al., 2011, 2013; Lorig et al., 2001). However, there is limited data in Canada on CDSMP's potential impact on health care utilization. The purpose of this study was thus to examine patterns of health care utilization directly from health administrative data 1 year prior to and following participation in our CDSMP, in order to inform policies about the implementation of these programs.

## Methods

We used a pre-post study design to examine potential changes in health care utilization before and after participation in the CDSMP.

### Setting and population

The Champlain LHIN is home to 1,188,800 of Ontario's 13.5 million people. Approximately half of the population of the Champlain LHIN is concentrated in Ottawa, but the region has many small towns and sparsely populated rural areas. The region is culturally and linguistically diverse, with francophone, Aboriginal, and newer immigrant populations.

### Design

Patients were invited to participate in workshops modeled after the Stanford CDSMP. Workshops were held weekly over a six week period, with each session taking 2.5 h to complete. Leaders, who could be either professional health care providers or peers, received CDSMP leadership training to equip them to lead the workshops. Throughout the six sessions, leaders assisted patients in developing a range of skills supporting self-management. These include tips on how to adopt healthier lifestyle behaviors, strategies for effective interactions with healthcare providers and family members, and instructions on how to use medications correctly. Each session focused on a different core skill.

All participants ( $n = 1000$ ) in the CDSMP workshops from September 2009 through to January 2011 were invited to complete an evaluation survey at the time of their workshop which included a request to provide their health card numbers in anticipation of being able to link attendance at the workshop with administrative data on health care usage.

We obtained administrative data from a number of sources housed at the Institute of Clinical Evaluative Sciences (ICES). The Ontario Health Insurance Plan (OHIP) database provided physicians' fee-for-service claims and information about services provided by each physician, including the date, diagnosis, fee code, amount paid, patient health card number, and physician unique identifying number. The ICES Physician Database (IPDB) provided information on physicians practicing in Ontario, including demographic information (e.g. age, sex), practice location, physician specialty, the types of service provided, where each physician was trained, and the year he/she graduated from medical school. The National Ambulatory Care Resource System (NACRS) database provided information on all visits to emergency departments (ED) in Ontario, including visit date, reasons for the ED visit defined by ICD-10 codes, planned and unplanned visits, and patients' health card numbers and demographics. The Discharge Abstract Database (DAD) provided hospital admissions data, including data on age, sex, postal code, date of admission, date of discharge, and most responsible diagnostic codes, as well as secondary and tertiary diagnostic codes based on ICD-10-CM codes and procedures performed. Overall excellent agreement has been found between administrative hospitalization data and chart audits (Williams & Young, 1996). Lastly, the Registered Persons Database (RPDB) provided the age, sex, residence, postal code, and dates of birth and death of each valid health card number holder in the province. The study was approved by the Ottawa Health Science

Network Research Ethics Board, the Bruyère Research Institute Research Ethics Board, and ICES.

### Outcomes

We examined the impact that participation in a CDSMP had on the number of general practitioner and specialist visits, planned/unplanned ED visits, and total hospitalizations 1 year prior to and after participation.

### Statistical analyses

Descriptive statistics were used to examine patterns of health care utilization at 6 and 12 months pre- and post-program. To compare differences in health care utilization variables, paired *t*-tests and Wilcoxon signed rank tests were performed. In addition, Poisson regression models fitted using generalized estimating equations were employed to examine changes in health care utilization at each 6- and 12-month time interval, and to account for correlations among repeated measurements. Models were adjusted for age, sex, marital status, income, rurality, and number of chronic conditions.

We used paired *t*-tests or Wilcoxon signed rank tests for each of the two cohorts and ANCOVA to compare the differences in changes between the two cohorts from baseline (1st CDSMP session) to 1 year follow-up.

## Results

We received completed baseline surveys from 228 responders, of whom 205 consented to link their data to administrative data on their health care usage. Nineteen respondents did not have valid health card numbers, resulting in a final sample of 186 participants. Participants were predominantly female, married, between 40 and 66 years of age, urban dwelling, and English speaking. They were slightly more likely to be in the lowest to income quartile and the majority had between 13 and 16 years of schooling. The majority of participants were diagnosed as having 2 to 4 chronic conditions (Table 1).

Participation in the CDSMP did not alter total physician visits at 6 or 12 months following the program (Table 2). When broken down from total physician visits into visits with family physicians versus specialist physicians, the numbers reveal similar consistency, with no significant change in visit frequency at either 6 or 12 months post-program.

Although the average number of ED visits was lower at 6 and 12 months post-CDSMP, and the average number of hospitalizations decreased between 6 months pre-CDSMP and 6 months post-CDSMP, none of these changes were statistically significant. More than 75% of CDSMP participants had no ED visits in the 6 months leading up to the program, and 57% of participants had no visits in the 12 months prior to the CDSMP (Table 3).

Multivariate analysis was performed to examine which participant characteristics were associated with increased or decreased health care utilization following participation in the CDSMP. Individuals with 5 or more chronic conditions, when compared to those with 1 chronic condition, were significantly more likely to visit their physicians as well as the emergency department in the 12 months following the CDSMP than they were in the previous 12 months (Table 4). This finding also applied to physician visits in the 6 month period before and after participation in the CDSMP (Appendix A).

Additional multivariate analysis was performed following stratification of the cohort by median age (Table 5, Appendix B, Appendix C). In the cohort sub-population of over 61 years of age, those with the marital status of widowed were significantly more likely than the married population to visit both their physicians and the emergency department in the 12 months post-CDSMP than they were in the 12 months pre-CDSMP (Table 5).

**Table 1**  
Demographic information for cohort (N = 186) population.

Variable	Category	Number (% of total)
Gender	Male	37 (19.89)
	Female	144 (77.42)
	Missing	<6 (2.69) <sup>a</sup>
Age	19–39	13 (6.99)
	40–66	111 (59.68)
	>66	62 (33.33)
Marital status	Single	52 (27.96)
	Married	84 (45.16)
	Divorced/separated	23 (12.37)
	Widowed	21 (11.29)
	Missing	6 (3.23)
Rurality	Urban	138 (74.19)
	Rural	44 (23.66)
	Missing	<6 (2.15) <sup>a</sup>
Language	English	149 (80.11)
	Missing	37 (19.89)
Number of chronic conditions	1	44 (23.66)
	2–4	111 (59.68)
	5+	29 (15.59)
	Missing	<6 (1.08) <sup>a</sup>
Income	Quintile 1	54 (29.03)
	Quintile 2	41 (22.04)
	Quintile 3	20 (10.75)
	Quintile 4	37 (19.89)
	Quintile 5	33 (17.74)
	Missing	<6 (0.54) <sup>a</sup>
Years of schooling	10 years or less	24 (12.9)
	11–12	41 (22.04)
	13–16	96 (51.61)
	>16	22 (11.83)
	Missing	<6 (1.61) <sup>a</sup>

Data collected between September 2009 and January 2011.

<sup>a</sup> Note: exact numbers of respondents below six cannot be reported in order to maintain privacy.

## Discussion

Our study did not find any statistically significant decreases in ED use, physician visits, or hospitalizations among individuals who attended the Ontario-based CDSMP. We found some interesting findings with increased ED utilization and physician visits with the older, widowed group. The same was true of individuals with >5 chronic conditions, regardless of age. As this study did not include a control cohort, it is difficult to tell whether the increased health care utilization was directly attributable to participation in the CDSMP, or whether it is reflective of a standard progression of this group's disease state and/or social isolation.

The reported effect of the CDSMP on resource utilization in the literature remains varied, reflecting that health resource utilization is likely

**Table 2**  
Health care utilization at 6 and 12 months prior to (pre-CDSMP) and following (post-CDSMP) participation in the Chronic Disease Self-Management Program (CDSMP). Data expressed as mean (standard deviation) number of visits.

Variable	6 months			12 months		
	Pre-CDSMP	Post-CDSMP	P-value	Pre-CDSMP	Post-CDSMP	P-value
Physician visits	6.13(4.94)	6.11(4.94)	0.97	12.32(9.31)	11.8(9.09)	0.59
GP/FP visits	3.03(2.57)	3.13(2.73)	0.71	6.21(4.84)	5.95(4.69)	0.59
Specialist visits	3.11(3.60)	2.96(3.52)	0.68	6.11(6.68)	5.80(6.54)	0.64
ED visits	0.51(1.42)	0.44(0.99)	0.58	1.01(1.88)	0.82(1.44)	0.29
Hospitalizations	0.16(0.50)	0.11(0.49)	0.40	0.23(0.63)	0.28(0.70)	0.49

Data collected between September 2009 and January 2011.

**Table 3**  
Total number of ED visits at 6 and 12 months pre- and post-Chronic Disease Self-Management Program (CDSMP). Data is expressed as total number of visits (% of total).

# of visits	6 months		12 months	
	Pre-CDSMP	Post-CDSMP	Pre-CDSMP	Post-CDSMP
0	140 (75.27)	142 (76.34)	106 (56.99)	113 (60.75)
1	28 (15.05)	23 (12.37)	41 (22.04)	37 (19.89)
2	9 (4.84)	13 (6.99)	18 (9.68)	17 (9.14)
3+	8 (4.30)	8 (4.30)	21 (11.29)	19 (10.22)

Data collected between September 2009 and January 2011.

impacted by multiple factors, including the health system context, local patterns of utilization, disease progression, and social context (e.g. spousal support). For example, our cohort had low baseline ED utilization, with three-quarters of participants having no ED visits in the 6 months before the start of the program and over half having no ED visits in the previous year. Similarly, another study that implemented a telehealth version of the CDSMP in rural populations in Canada (Jaglal et al., 2013) observed no differences in health care utilization 1 year pre- and post-participation (Jaglal et al., 2014).

In contrast, a study of the Alberta Healthy Living Program, a community-based chronic disease management program that in addition to group CDSMP workshops also included education sessions and free exercise programs, showed a 14% overall reduction in ED visits and 64% reduction in ED visits for high risk patients (patients with  $\geq 2$  ED visits in the year prior to participation) (Morrin et al., 2013). Inpatient admissions were 75% lower at follow-up for high risk patients (Morrin et al., 2013). The intensity and duration of this program were greater than the standard 6 week workshop. CDSMP participants have reported diverse positive effects, the most significant of which related to physical activity, social connectedness, and increased community resource utilization. However, interactions with the health system were reported as frustrating, as some of their physicians lacked expertise in self-management and were unable to link participants with local self-management resources (Johnston et al., 2012). Thus a broader approach, such as linking with an exercise class as seen in Alberta, may have greater impact.

Our findings are also consistent with a series of studies conducted in the United Kingdom (Griffiths et al., 2007). A meta-analysis conducted in 2013 examined the results of 23 studies across diverse populations exploring the effects of the CDSMP on a number of health outcomes. Aside from a small reduction in the number of days or nights of hospitalization at 4–6 months after baseline, the analysis found no significant associations between the CDSMP and health care utilization (Brady et al., 2013).

Though findings on health care utilization have been mixed, the CDSMP has been consistently shown to have positive impact in other areas, including self-efficacy, health status, health behaviors, and self-rated health (Brady et al., 2013; Lorig et al., 2001). As communities and practices are increasingly focusing on promoting optimal health care resource utilization, CDSMPs may contribute to decreased overall health care utilization as shown in some study populations. However, a CDSMP alone may not be sufficient to reduce health care utilization,

**Table 4**

Multivariate analysis examined the relationship between the variables listed and change in visit frequency to physicians and to the emergency department at 12 months pre- and post-Chronic Disease Self-Management Program (CDSMP).

Variable (Comparator)	Category	Physician visits			ED visits				
		Estimate	95% CI (lower; upper)	P value	Estimate	95% CI (lower; upper)	P value		
Intercept		2.01	1.46	2.56	<.0001	1.68	0.13	3.23	0.03
Program		−0.04	−0.11	0.04	0.37	−0.16	−0.54	0.22	0.42
Gender (ref = female)	Male	−0.08	−0.31	0.15	0.49	<b>0.70</b>	<b>0.00</b>	<b>1.40</b>	<b>0.05</b>
Age group (ref = 19–39)	40–66	0.04	−0.37	0.45	0.85	− <b>2.22</b>	− <b>3.41</b>	− <b>1.03</b>	<b>0.00</b>
	>66	0.03	−0.39	0.45	0.89	− <b>2.48</b>	− <b>3.73</b>	− <b>1.22</b>	<b>0.00</b>
Rurality (ref = urban)	Rural	− <b>0.22</b>	− <b>0.43</b>	− <b>0.02</b>	<b>0.03</b>	0.38	−0.29	1.05	0.27
Marital status (ref = married)	Single	0.13	−0.11	0.36	0.30	−0.23	−0.94	0.49	0.53
	Divorced	0.11	−0.21	0.42	0.51	0.45	−0.36	1.25	0.28
	Widowed	0.37	−0.01	0.75	0.06	0.75	−0.18	1.68	0.11
Number of chronic conditions (ref = 1)	2–4	0.17	−0.08	0.42	0.18	0.48	−0.21	1.18	0.17
	5+	<b>0.71</b>	<b>0.42</b>	<b>1.00</b>	<b>&lt;.0001</b>	<b>1.59</b>	<b>0.69</b>	<b>2.48</b>	<b>0.00</b>
Income (ref = quintile 1)	Quintile 2	0.19	−0.10	0.48	0.19	−0.04	−0.84	0.75	0.92
	Quintile 3	−0.24	−0.61	0.13	0.20	0.05	−0.89	0.99	0.92
	Quintile 4	0.06	−0.22	0.35	0.66	− <b>0.81</b>	− <b>1.59</b>	− <b>0.03</b>	<b>0.04</b>
	Quintile 5	0.23	−0.02	0.48	0.07	0.33	−0.47	1.13	0.42

Statistically significant values shown in bold.

Data collected between September 2009 and January 2011.

as it is not clear which patients will improve health care utilization patterns after participation. Ongoing evaluation research is needed to better understand the population impact of the CDSMP with regular linkages to administrative data in a larger cohort over a longer time frame.

#### Limitations

The small sample size reduced our ability to detect changes in the study cohort pre- and post-program. Low utilization rates among our cohort likewise limited the program's potential effectiveness. Our study relied on administrative data, which is unable to accurately capture the presence of chronic disease or the level of patients' participation in a CDSMP. We used time points of 6 and 12 months, which may have been insufficient to measure the study's full impact. It is possible that time periods of 2, 5, or even 10 years may reveal significant improvements in health care utilization. We do not have exact attendance data for our sample, and consequently some participants may have not attended all six workshop sessions. We were unable to compare participants who completed surveys with those who did not, which affects the generalizability of our analysis. Our chosen outcome of health care utilization is broad, which can cause difficulties in finding correlations with

course participation. Lastly, our study lacked a control cohort, which made it unable to observe the effect of such factors as changing disease states, social support networks, and patient–physician communication.

#### Conclusions

We found no statistically significant improvements regarding health care utilization among participants in our Ontario-based CDSMP. Low utilization rates, short term follow-ups, and a relatively healthy patient population may have contributed to the program's low impact on health care utilization rates. However, communities should continue to offer CDSMPs to patients with chronic conditions who might benefit from the established effects of improved self-efficacy and decreased health distress.

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.pmedr.2015.07.001>.

#### Conflict of interest statement

The authors declare that there are no conflicts of interest.

**Table 5**

Multivariate analysis examined the relationship between the variables listed in the cohort subgroup above age 61, and change in visit frequency to physicians and to the emergency department at 12 months pre- and post-Chronic Disease Self-Management Program (CDSMP).

Variable (Comparator)	Category	Physician visits			ED visits				
		Estimate	95% CI (lower; upper)	P value	Estimate	95% CI (lower; upper)	P value		
Intercept		1.98	1.31	2.65	<.0001	−1.50	−3.21	0.20	0.08
Program		0.03	−0.07	0.12	0.57	−0.16	−0.73	0.41	0.58
Gender (ref = female)	Male	−0.17	−0.57	0.23	0.41	0.41	−0.56	1.37	0.41
Rurality (ref = urban)	Rural	−0.25	−0.65	0.08	0.16	0.62	−0.31	1.54	0.19
Marital status (ref = married)	Single	0.03	−0.34	0.40	0.87	−0.34	−1.46	0.77	0.55
	Divorced/separated	0.48	−0.02	0.99	0.06	0.49	−0.80	1.78	0.46
	Widowed	<b>0.57</b>	<b>0.11</b>	<b>1.04</b>	<b>0.02</b>	<b>1.28</b>	<b>0.03</b>	<b>2.52</b>	<b>0.04</b>
Number of chronic conditions (ref = 1)	2–4	0.11	−0.31	0.52	0.62	0.31	−0.83	1.45	0.59
	5+	<b>0.62</b>	<b>0.10</b>	<b>1.14</b>	<b>0.02</b>	<b>1.69</b>	<b>0.26</b>	<b>3.12</b>	<b>0.02</b>
Income (ref = quintile 1)	Quintile 2	0.30	−0.07	0.68	0.11	−0.18	−1.27	0.90	0.74
	Quintile 3	−0.31	−0.90	0.28	0.31	0.14	−1.24	1.53	0.84
	Quintile 4	−0.02	−0.50	0.45	0.92	−1.02	−2.30	0.26	0.12
	Quintile 5	0.35	−0.03	0.72	0.07	1.04	−0.10	2.18	0.07

Statistically significant values shown in bold.

Data collected between September 2009 and January 2011.



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## References

- World Health Organization, 2014. Chronic Diseases and Health Promotion [World Health Organization Website]. (Available at: <http://www.who.int/chp/en/>. Accessed Oct 3, 2014).
- Moore, G., 1999. Activity limitation and chronic conditions in Canada's elderly, 1986–2011. *Disabil. Rehabil.* 21, 196–210. <http://dx.doi.org/10.1080/096382899297620>.
- Lemmens, K.M.M., Nieboer, A.P., Van Schayck, C.P., et al., 2008. A model to evaluate quality and effectiveness of disease management. *Qual. Saf. Health Care* 17, 447–453. <http://dx.doi.org/10.1136/qshc.2006.021865>.
- Wagner, E.H., Austin, B.T., Von Korff, M., 1996. Organizing care for patients with chronic illness. *Milbank Q.* 74, 511–544.
- Bodenheimer, T., Lorig, K., Holman, H., et al., 2002. Patient self-management of chronic disease in primary care. *JAMA* 288, 2469–2475. <http://dx.doi.org/10.1001/jama.288.19.2469>.
- Barlow, J., Wright, C., Sheasby, J., et al., 2002. Self-management approaches for people with chronic conditions: a review. *Patient Educ. Couns.* 48, 177–187. [http://dx.doi.org/10.1016/S0738-3991\(02\)00032-0](http://dx.doi.org/10.1016/S0738-3991(02)00032-0).
- Newman, S., Steed, L., Mulligan, K., 2004. Self-management interventions for chronic illness. *Lancet* 364, 1523–1537. [http://dx.doi.org/10.1016/S0140-6736\(04\)17277-2](http://dx.doi.org/10.1016/S0140-6736(04)17277-2).
- Griffiths, C., Foster, G., Ramsay, J., et al., 2007. How effective are expert patient (lay led) education programmes for chronic disease? *BMJ* 334, 1254–1256. <http://dx.doi.org/10.1136/bmj.39227.698785.47>.
- Stanford School of Medicine, 2014. Chronic Disease Self-Management Program (Better Choices, Better Health Workshop) [Stanford School of Medicine Website]. (Available at: <http://patienteducation.stanford.edu/programs/cdsmp.html>. Accessed Oct 3, 2014).
- Brady, T.J., Murphy, L.F., O'Colmain, B.J., et al., 2013. A meta-analysis of health status, health behaviors, and healthcare utilization outcomes of the Chronic Disease Self-Management Program. *Prev. Chronic Dis.* 10, 120112. <http://dx.doi.org/10.5888/pcd10.120112>.
- Harvey, P.W., Petkov, J.N., Misan, G., et al., 2008. Self-management support and training for patients with chronic and complex conditions improves health-related behaviour and health outcomes. *Aust. Health Rev.* 32, 330–338. <http://dx.doi.org/10.1071/AH080330>.
- Lorig, K.R., Hurwicz, M.L., Scobel, D., et al., 2005. A national dissemination of an evidence-based self-management program: a process evaluation study. *Patient Educ. Couns.* 59, 69–79. <http://dx.doi.org/10.1016/j.pec.2004.10.002>.
- Kennedy, A., Reeves, D., Bower, P., et al., 2007. The effectiveness and cost effectiveness of a national lay-led self care support programme for patients with long-term conditions: a pragmatic randomised controlled trial. *J. Epidemiol. Community Health* 61, 254–261. <http://dx.doi.org/10.1136/jech.2006.053538>.
- Liddy, C., Johnston, S., Irving, H., Nash, K., 2013. The Community Connection Model: implementation of best evidence into practice for self-management of chronic diseases. *Public Health* 127, 538–545. <http://dx.doi.org/10.1016/j.puhe.2013.02.005>.
- Gately, C., Rogers, A., Sanders, C., 2007. Re-thinking the relationship between long-term condition self-management education and the utilisation of health services. *Soc. Sci. Med.* 65, 934–945. <http://dx.doi.org/10.1016/j.socscimed.2007.04.018>.
- Lorig, K.R., Ritter, P., Stewart, A.L., et al., 2001. Chronic disease self-management program: 2-year health status and health care utilization outcomes. *Med. Care* 39, 1217–1223.
- Brady, T.J., Murphy, L., Beauchesne, D., et al., 2011. Sorting Through the Evidence for the Arthritis Self-Management Program and the Chronic Disease Self-Management Program: Executive Summary of ASMP/CDSMP Meta-analysis. Centers for Disease Control and Prevention, Atlanta (Available at: <http://www.cdc.gov/arthritis/docs/asmp-executive-summary.pdf> Accessed Oct 3, 2014).
- Williams, J.I., Young, W., 1996. A summary of studies on the quality of health care administrative databases in Canada. In: Goel, V., Williams, J.I., Anderson, G.M. (Eds.), *Patterns of Health Care in Ontario: The ICES Practice Atlas*, 2nd ed. Canadian Medical Association, Ottawa, pp. 339–345.
- Jaglal, S.B., Haroun, V.A., Salbach, N.M., et al., 2013. Increasing access to chronic disease self-management programs in rural and remote communities using telehealth. *Telemed. J E Health* 19, 467–473. <http://dx.doi.org/10.1089/tmj.2012.0197>.
- Jaglal, S.B., Guilcher, S.J., Hawker, G., et al., 2014. Impact of a Chronic Disease Self-Management Program on health care utilization in rural communities: a retrospective cohort study using linked administrative data. *BMC Health Serv. Res.* 14, 198. <http://dx.doi.org/10.1186/1472-6963-14-198>.
- Morrin, L., Britten, J., Davachi, S., et al., 2013. Alberta healthy living program—a model for successful integration of chronic disease management services. *Can. J. Diabetes* 37, 254–259. <http://dx.doi.org/10.1016/j.cjcd.2013.04.001>.
- Johnston, S., Irving, H., Mill, K., Rowan, M.S., Liddy, C., 2012. The patient's voice: an exploratory study of the impact of a group self-management support program. *BMC Fam. Pract.* 13, 65. <http://dx.doi.org/10.1186/1471-2296-13-65>.