RESEARCH PAPER

Impact of Type of Medical Specialist Involvement in Chronic Illness Care on Emergency Department Use

Impact du type d'implication du médecin spécialiste sur le recours aux services d'urgences dans les cas de maladies chroniques

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Abstract

Objectives: Medical specialist physicians may act as either consultants or co-managers for patients managed in primary care settings. We assessed whether the type of specialist involvement affected emergency department (ED) use for patients with chronic diseases.
Methods: In total, 709 primary care patients with arthritis, chronic obstructive pulmonary disease, diabetes or congestive heart failure were followed for one year using survey and administrative data. Multivariate logistic regressions were used to compare all-cause ED use according to specialist involvement (none, co-manager or consultant).
Results: In total, 240 (34%) patients visited the ED. ED use did not differ between those with specialist involvement and those without it, either as co-managers (adjusted OR = 1.06, 95% CI = [0.61, 1.85]) or consultants (adjusted OR = 0.97, 95% CI = [0.63, 1.50]).

Discussion: The type of specialist involvement is not associated with all-cause ED use in primary care patients with chronic diseases. Indications for co-management should be further investigated.

Résumé

Objectifs : Les médecins spécialistes peuvent participer, comme cogestionnaires ou consultants, à la gestion des patients dans les établissements de soins ambulatoires. Nous avons évalué dans quelle mesure le type d'implication du spécialiste influence le recours à l'urgence chez les patients atteints de maladies chroniques.
Méthodes : En tout, 709 patients atteints d'arthrite, de maladie pulmonaire obstructive chronique, de diabète ou d'insuffisance cardiaque ont été suivis pendant un an à l'aide de questionnaires et de données administratives. Des régressions logistiques multivariées ont servi à comparer le recours à l'urgence par rapport au type d'implication du spécialiste (aucune, cogestionnaire ou consultant).
Résultats : En tout, 240 (34 %) patients ont eu recours à l'urgence. Le recours aux services d'urgence n'était pas différent entre les cas où un spécialiste s'implique et ceux où il n'y a pas de telle implication, que ce soit comme cogestionnaire (RC ajusté = 1,06, IC à 95 % = 0,61–1,85) ou comme consultant (RC ajusté = 0,97, IC à 95 % = 0,63–1,50).
Discussion : Il n'y aurait pas de lien entre le type d'implication du spécialiste et le recours aux services d'urgence pour les patients atteints de maladies chroniques en soins ambulatoires. Les recommandations quant à la cogestion devraient être étudiées plus profondément.

The impact of medical specialist involvement in the provision of ambulatory care for patients with chronic diseases (CDs) may vary depending on the role taken by the specialist (co-manager vs. consultant). Specialists are involved as co-managers when they act as regular care providers in the management of their patients, sharing responsibilities with the primary care physician (PCP) for long-term follow-up of the referred health problem (Forrest 2009). On the other hand, specialists are involved as consultants when their role is limited to providing diagnostic/management advice to PCPs or performing diagnostic/curative technical interventions without providing ongoing management for the health problem (Forrest 2009). For example, in the case of consultation, a PCP could refer a patient with knee osteoarthritis to the orthopaedist for an injection. Once the intervention would be completed, the patient would return to the PCP for follow-up and would only return to see an orthopaedist when further advice or intervention would be sought. In the case of co-management, the patient would return regularly to the orthopaedist for monitoring of his arthritis and adjustment of the treatment plan. The patient would still be attended by the PCP for management of other health needs.

Patients with CDs are often frequent users of emergency departments (EDs), and most of their direct costs are actually attributed to ED and hospital admissions (American Diabetes Association 2008; Bustacchini et al. 2011; Liao et al. 2008). This is mainly due to exacerbations/complications of their conditions requiring rapid access to advanced care; they also use the ED as an alternate source of primary care for their conditions when access to a PCP is limited (Ionescu-Ittu et al. 2007; McCusker et al. 2010; Saxena et al. 2006). In fact, for patients with CDs living in the community, ED use is considered a sensitive indicator of quality and efficacy of ambulatory care, especially for congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD) or diabetes, as a significant proportion of ED visits and hospitalizations could be prevented by proper ambulatory care (Ionescu-Ittu et al. 2007; Liu et al. 2010; McCusker et al. 2010; Roos et al. 2005; Saxena et al. 2006). However, little is known regarding the impact of specialist involvement in the ambulatory care of patients with CDs on ED use. Furthermore, it is not known whether co-management is superior to consultation with respect to preventing ED use. Such information is needed to improve CD management and consequently reduce adverse events leading to preventable ED visits for patients, as well as to decrease consequent healthcare costs and ED overcrowding/wait times for the whole healthcare system (Canadian Institute for Health Information 2007). Therefore, our objective was to determine the impact of the type of specialist involvement on all-cause ED use for patients with CDs managed in the primary care setting.

Methods

Design, recruitment and data collection

We followed a cohort of adults with CDs living in the Montreal and Montérégie regions of Quebec (Canada) between 2006 and 2008 (Feldman et al. 2012; Lemieux et al. 2011). Out of the 675 primary care organizations found in these regions (Gouvernement du Québec and Centre de recherche de l'Hôpital Charles LeMoyne 2009), we contacted 90 primary healthcare practices providing services for patients with CDs, representing all types of primary healthcare practice arrangements (solo, Conventional group practices, Family Medicine Groups, Community health centres and Hospital-based family medicine units) and having at least four PCPs when being a group practice. In total, 33 primary healthcare practices referred 1,031 patients with diabetes, arthritis, CHF or COPD, of whom 776 provided written informed consent and entered the cohort. Patients were interviewed at baseline and subsequently at 6, 12 and 18 months using standardized questionnaires regarding sociodemographic/clinical characteristics, utilization and quality of care, as well as health and quality-of-life outcomes. We also linked patient data from the provincial physician reimbursement administrative database, including information over the period of 12 months prior to entry into the study until 12 months after entry. The entire population of Quebec is covered by provincial health insurance, and physicians bill the province for ambulatory services rendered to patients. A referral by a physician is usually required to consult a specialist physician, as there are financial incentives for specialists delivering services with a referral.

Specialist involvement

Specialist involvement was determined using the physician reimbursement database and was defined as having at least one outpatient (ED excluded) encounter with a relevant specialist in the 12 months prior to entry in the study. Relevant specialists considered for each diagnosis were cardiologist for CHF, respirologist for COPD, endocrinologist for diabetes and rheumatologist or orthopaedist for arthritis. Patients with specialist involvement were further classified according to the type of involvement using the following question at baseline: *Which clinic mainly follows you for your (diagnosis)? (a) your primary care clinic, where your general practitioner is; or (b) your specialized clinic, where your specialist doctor is*. Those answering (*b*) were classified as being co-managed by a specialist. For those who answered (*a*), we used a second question asked at the 18-month follow-up to further determine the type of involvement: *In addition to being followed by a general practitioner for your (diagnosis), are you also followed by a specialist doctor? If yes, for how many years have you been followed by the specialist?* Participants who reported being followed by a specialist for at least two years were classified as being co-managed at entry into the study. All remaining participants were not considered as being co-managed – any previous contact with a specialist was considered to be on a consultant basis.

Covariates

Age, gender, highest level of education completed, area of residency (Montreal = urban, Montérégie = rural), co-morbidity and disease-specific health-related quality of life (HRQoL) were measured (Feldman et al. 2012). Co-morbidity level was measured by the number of reported conditions from a list of 17 common CDs. We used disease-specific HRQoL as a proxy for disease severity, using the following tools: Health Assessment Questionnaire (HAQ) for arthritis (Bruce and Fries 2003; Maska et al. 2011), the Minnesota Living with Heart Failure (Garin et al. 2009; Sneed et al. 2001), the Chronic Respiratory Questionnaire for COPD (Lacasse et al. 1996; Schünemann et al. 2005) and the Audit of diabetes-dependant quality of life (ADDQoL) (Bradley et al. 1999). Scores were standardized on a common scale with a mean of 50 and a standard deviation (SD) of 10 (Streiner and Norman 2008), with lower scores representing less HRQoL (more severe cases). We also computed the number of outpatient physician encounters (ED excluded) in the previous 12 months using the physician reimbursement administrative database. For patients followed in community health centres or hospital-based family medicine units where PCPs are salaried instead of being paid on a fee-for-services basis, we added their self-reported number of PCP visits in the preceding year to those captured by the administrative database. We also estimated experience of PCP based on graduation year of the physician, using administrative data from the Quebec College of Physicians (licensing board).

Emergency department utilization

We used the physician reimbursement database to record all-cause ED admissions (regardless of subsequent hospitalization or not) over the 12 months following entry into the study. Patients were classified as ED users if they had at least one ED admission during the follow-up period.

Statistical analyses

Chi-square and Kruskall–Wallis tests were used to compare patient characteristics according to type of specialist involvement (none, consultant or co-manager). Crude rates and crude odds ratios (ORs) of ED use according to type of specialist involvement were computed along with their 95% confidence intervals (95% CI) across each diagnosis. Adjusted ORs of ED use according to type of specialist involvement were estimated with simple multivariate logistic regression models instead of multilevel ones, as exploratory analyses indicated that despite our nested sampling design, there was no clustering at practice level. Diagnosis, co-morbidity, HRQoL, physician outpatient visits, age, gender, education, area of residency and experience of PCP were entered to adjust for case mix. Experience of PCP was kept only if it modified ORs significantly (change ≥5%). Interaction of the type of specialist involvement with diagnosis was further tested by adding a product term and using the likelihood ratio test. Data were analyzed using SPSS 15.0 (IBM, Chicago). The study was approved by the research ethics committees of the relevant institutions.

Results

Out of the 776 patients who consented, 709 had complete data, which were used for analyses. There were no significant differences between participants and non-participants according to diagnosis, gender and age (results not shown). The majority of participants were at least 65 years old (54.2%, minimum = 22, maximum = 97) and had at least one co-morbidity (74.8%, minimum = 0, maximum = 13) (Table 1).

At baseline, 238 patients (33.6%) had at least one visit to a relevant specialist in the preceding year (median = 2.0 visits, minimum = 1, maximum = 21). Of these, 164 (68.9%) were co-managed and 74 others were classified as having visited the specialist on a consultation basis. The number of visits to the specialist in the previous year was higher for those who were co-managed (median = 2.0, interquartile range [IQR] = 1–4) than for those with consultation (median = 2.0, IQR = 1–3, $p = 0.047$). Patients with CHF were more likely to be co-managed as were those who lived in an urban area, had lower HRQoL and more co-morbidities (Table 1).

There were 240 patients (34%) with at least one admission to the ED during the 12-month follow-up period (median = 1.0 visit, IQR = 1–2, maximum = 18). ED use varied across diseases (Table 2, $p < 0.001$), with CHF and COPD patients having higher rates than those with arthritis or diabetes. This pattern was not present in the sub-sample of patients with specialist involvement either as co-manager ($p = 0.962$) or consultant ($p = 0.406$).

Co-managed patients had higher odds of visiting the ED than those who did not see a specialist (crude odds ratio [OR] = 1.65, 95% CI = [1.14, 2.38], Table 3). Patients with specialist involvement as a consultant presented a similar trend (crude OR = 1.46, 95% CI = [0.88, 2.43]). Crude ORs did not vary across diagnoses for co-management ($p = 0.168$) or for specialist involvement as a consultant ($p = 0.750$).

TABLE 1. Characteristics of participants according to type of specialist involvement ($N = 709$)

Characteristics	Overall* ($N = 709$)	Type of Specialist Involvement*			Difference Between Types (p-value)
		None ($n = 471$)	Consultant ($n = 74$)	Co-manager ($n = 164$)	
Diabetes	34.6	44.2	20.3	14.0	<0.001¶
Congestive heart failure	19.4	12.1	28.4	37.2	
Chronic arthritis	26.8	24.2	39.2	27.4	
COPD	19.3	19.5	12.2	21.3	
Co-morbidity, Median (IQR) count	3.0 (1–4)	3.0 (1–4)	3.0 (2–5)	3.0 (2–5)	0.017§
HRQoL, Mean (SD) score	50.1 (9.9)	50.4 (10.2)	50.9 (8.6)	48.3 (9.9)	0.043§
Ambulatory physician utilization, Median (IQR) encounters	9.0 (6–15)	8.0 (5–12)	14.0 (9–19)	13.0 (8–20)	<0.001¶
Female	54.8	54.6	50.0	56.7	0.630
Male	45.2	45.4	50.0	43.3	
Age, Mean (SD) years	66.9 (11.7)	66.5 (12.0)	69.3 (10.9)	67.1 (11.1)	0.164
Education < High school	47.6	48.8	50.0	42.1	0.159
High school/vocational diploma	28.5	29.7	28.4	26.8	
Education > High school	23.9	21.4	21.6	31.1	
Urban area of residency	58.9	51.8	64.9	75.0	<0.001¶
Rural area of residency	41.1	48.2	35.1	25.0	
Experience of PCP, Mean (SD) years	27.2 (8.5)	27.0 (8.3)	27.2 (8.9)	27.7 (8.9)	0.686

*Values are in % unless otherwise indicated. §Patients with specialist co-management are significantly different from non-users ($p < 0.05$). ¶Both groups with specialist involvement are significantly different from non-users ($p < 0.05$). COPD = chronic obstructive pulmonary disease; IQR = interquartile range; SD = standard deviation; HRQoL = health-related quality of life.

TABLE 2. Rates in percentage of all-cause emergency department use according to type of specialist involvement and main diagnosis

Type of Specialist Involvement	Main Diagnosis				Difference Across Diagnoses (p-value)
	Arthritis $n = 188$ % (95% CI)	Diabetes $n = 246$ % (95% CI)	CHF $n = 139$ % (95% CI)	COPD $n = 136$ % (95% CI)	
None ($n = 471$)	21.1 (13.6, 28.5)	25.0 (19.1, 30.9)	42.1 (29.3, 54.9)	47.8 (37.6, 58.0)	<0.001
Consultant ($n = 74$)	34.5 (17.2, 51.8)	26.7 (4.3, 49.0)	52.4 (31.0, 73.7)	44.4 (12.0, 76.9)	0.406
Co-manager ($n = 164$)	40.0 (25.7, 54.3)	39.1 (19.2, 59.1)	44.3 (31.8, 56.7)	42.9 (26.5, 59.3)	0.962
Overall ($n = 709$)	27.7 (21.3, 34.1)	26.4 (20.9, 31.9)	44.6 (36.3, 52.9)	46.3 (37.9, 54.7)	<0.001

CHF = congestive heart failure; COPD = chronic obstructive pulmonary disease; 95% CI = 95% confidence interval.

TABLE 3. Crude odds ratios of all-cause emergency department use according to type of specialist involvement and main diagnosis

Main Diagnosis	Type of Specialist Involvement*	
	Consultant OR (95% CI)	Co-manager OR (95% CI)
Arthritis	1.97 (0.81, 4.80)	**2.50 (1.18, 5.28)**
Diabetes	1.09 (0.33, 3.57)	1.93 (0.79, 4.72)
CHF	1.51 (0.55, 4.13)	1.09 (0.53, 2.26)
COPD	0.87 (0.22, 3.46)	0.82 (0.37, 1.79)
Overall	1.46 (0.88, 2.43)	**1.65 (1.14, 2.38)**

*The reference category is no specialist involvement. Bold = ratio differs significantly from 1.00 ($p < 0.05$). OR = odds ratio; 95% CI = 95% confidence interval; CHF = congestive heart failure; COPD = chronic obstructive pulmonary disease.

Multivariate analyses indicated that patients with specialist involvement as a consultant (adjusted OR = 1.06, 95% CI = [0.61, 1.85]) or a co-manager (adjusted OR = 0.97, 95% CI = [0.63, 1.50]) were not more or less likely to visit the ED than those who had no contact with a specialist (Table 4). We constructed a regression model that included interaction of specialist involvement and primary diagnosis. Because the impact of either co-management or consultation on ED use was similar, we calculated the model with a binary-level independent variable of any specialist involvement versus no contact with a specialist. We found a significant interaction of specialist involvement with diagnosis ($p = 0.03$) and proceeded to perform stratified analyses. For patients with COPD, specialist involvement tended to have a protective effect on ED admission (adjusted OR = 0.47, 95% CI = [0.19, 1.20]), whereas for arthritis (adjusted OR = 1.94, 95% CI = [0.91, 4.16]) and patients with diabetes (adjusted OR = 1.30, 95% CI = [0.55, 3.08]), it tended to have a detrimental one. There was no effect for patients with CHF (adjusted OR = 1.10, 95% CI = [0.48, 2.55]).

Discussion

We found that the type of specialist involvement (co-management or consultant) did not have a differential effect on all-cause ED use for patients with CDs who were managed in the primary care setting. However, we found that impact of specialist involvement (irrespective of specialist's role) on all-cause ED use varied across diagnoses, with a tendency to have a protective effect only for patients with COPD.

We expected that co-management would present a greater advantage regarding optimizing treatment plans and possibly reducing ED visits; however, this hypothesis was not corroborated. Although co-management implies that both the specialist and the PCP share responsibility for patient management (Forrest 2009), it does not necessarily imply shared care, i.e., formalized collaboration between providers (Smith et al. 2008). We had no information regarding the quality of primary–specialty care coordination, which may explain the present findings. Another possible explanation is that our patients,

recruited in primary care settings, were actively followed by their PCP who was, for the most part, capable of managing the condition appropriately on their own. Several authors contend that for conditions frequently encountered in the primary care setting, patients should be followed by their PCP and specialist involvement should be on a consultation basis only (i.e., not as a co-manager) (Forrest 2009; Jiwa et al. 2008; O'Malley and O'Malley 2007; Starfield 2010). Our results support this notion. Specialist involvement as a consultant (associated with fewer visits to the specialist) could potentially free up some valuable time for the specialist to see more patients (Valderas et al. 2009a).

TABLE 4. Results of multivariate logistic regression analyses of the impact of the type of specialist involvement on annual all-cause emergency department use in patients with chronic diseases ($N = 709$)

Predictors*	Levels	Adjusted OR	95% CI
Specialist involvement	None	1	–
	Co-manager	0.97	0.63, 1.50
	Consultant	1.06	0.61, 1.85
Diagnosis§	Arthritis	1	–
	CHF	1.94	1.17, 3.20
	Diabetes	1.12	0.71, 1.77
	COPD	2.35	1.45, 3.81
Number of co-morbidities	0–1	1	–
	2–3	1.32	0.84, 2.06
	≥4	1.60	1.01, 2.55
HRQoL§	–	0.97	0.95, 0.99
Number of ambulatory visits§	–	1.04	1.02, 1.07
Gender	Male	1	–
	Female	1.05	0.75, 1.49
Age (years)	≤63	1	–
	64–73	0.83	0.55, 1.30
	≥74	1.18	0.77, 1.80
Education level	<High school	1	–
	High school	0.79	0.53, 1.18
	>High school	0.90	0.58, 1.38
Area of residence§	Urban	1	–
	Rural	0.67	0.47, 0.96

*Experience of PCP is not included in the model, as it did not modify estimates. §$p < 0.05$. OR = odds ratio; 95% CI = 95% confidence interval; CHF = congestive heart failure; COPD = chronic obstructive pulmonary disease; HRQoL = health-related quality of life.

Irrespective of the type of involvement, respirologist utilization showed a trend (although non significant) towards reduced risk of ED admission for patients with COPD. This is consistent with decreased mortality observed with respirologist involvement (Nie et al. 2007) and may be due to higher conformity to guidelines and use of the most up-to-date management approaches often associated with specialist involvement (Arnold-Worner et al. 2008; Cook et al. 2009; Gnavi et al. 2009; Shah et al. 2005; Widdifield et al. 2011). We did not find reduction in ED visits for patients with CHF who had contact with a cardiologist in our sample, which contrasts with results in the literature (Ezekowitz et al. 2005; Lee et al. 2010). A possible explanation is that our participants were not recruited following ED or hospital admission for CHF (unlike those in the other studies) and may, therefore, be less apt to profit from cardiologist involvement, which would particularly benefit more severe cases (Ansari et al. 2003). Surprisingly, specialist involvement tended to be associated with increased ED use in patients with diabetes and arthritis. Although endocrinologist/diabetologist involvement prevents diabetic-specific complications (e.g., ketoacidosis or retinopathy) (Booth and Fang 2003; Liu et al. 2011; Zgibor et al. 2002), all-cause mortality was found to increase with endocrinologist involvement (McAlister et al. 2007). It is possible that involvement of the specialist could unintentionally increase fragmentation of care, contributing to higher use of ED for all causes (Liu et al. 2010; McAlister et al. 2007). Fragmentation of care may have a greater impact on all-cause ED use for patients with diabetes and arthritis in which co-morbidities (rather than the disease itself) usually account for more morbidity and mortality than in patients with CHF and COPD (Deshpande et al. 2008; Halpin and Miravitlles 2006; Mosterd and Hoes 2007).

Strengths and limitations

Strengths of our study include having information from physicians on patient diagnosis; patient-reported information regarding socioeconomics, co-morbidities, HRQoL and services use; and administrative data on utilization of services. To the best of our knowledge, this is the first study to consider the role of specialists in terms of consultant or co-manager and its association with ED use in patients with CDs. Although we were able to control for many potential confounders and to use multiple sources of data to minimize measurement errors, some limitations need to be addressed. We did not have either clinical or physiologic indicators of illness severity to adjust for case mix. Though proxies were used (HRQoL and number of ambulatory visits), there may be residual confounding by indication. A co-morbidity index considering severity of co-morbidities (e.g., Charlson Co-morbidity Index) would have adjusted for case-mix in terms of burden of disease (Charlson et al. 1987; Valderas et al. 2009b). However, our data were less compatible with these types of indices for a third of our sample followed in community health centres or hospital-based family medicine units, where PCPs are salaried instead of being paid on a fee-for-services basis, and we, therefore, opted for disease count. Nevertheless, sensitivity analyses using the Johns Hopkins ACG System (Johns Hopkins University, Baltimore), which captures disease burden,

yielded similar results (not shown) in a sub-sample of participants with compatible data. Our participation rates were relatively low for both practices (37%) and patients (68%). Although we cannot completely exclude a selection bias, participating practices did not differ from non-participating ones regarding type of arrangement, number of PCPs or propensity for quality of care for CDs (results not shown). Additionally, participating patients did not differ from non-participating ones regarding main diagnosis, age and gender (results not shown). Finally, prospective studies are needed that would have more information on clinical data (such as disease burden) and other patient characteristics (such as patient expectations) to better assess the impact of adding a specialist in co-management on ED use.

In terms of external validity, it is important to underline that the patients with arthritis probably had mainly osteoarthritis, which is the most frequent form of arthritis (Lagacé et al. 2010), and, therefore, our results may not be generalized to populations limited to inflammatory arthritis where specialist involvement is optimal (Lacaille et al. 2005; Widdifield et al. 2011). Furthermore, our participants came from practices formally providing services for CDs and had a regular PCP. Association between the type of specialist involvement and ED use may differ in patients followed in other practices or without a regular source of primary care.

Conclusion

For patients living in the community with CDs and who were followed by their PCP, there was no difference in all-cause ED utilization between those with specialist involvement as a co-manager and those with consultant as a co-manager. The impact of the type of specialist involvement for patients with common CDs should be investigated with other outcomes (e.g., physiological, patient-reported or economic) to further understand indications for co-management. Nevertheless, overall specialist involvement regardless of its type tended to be associated with decreased risk of visiting the ED only for patients with COPD. Greater emphasis on coordination of care may be needed to prevent all-cause ED admission.

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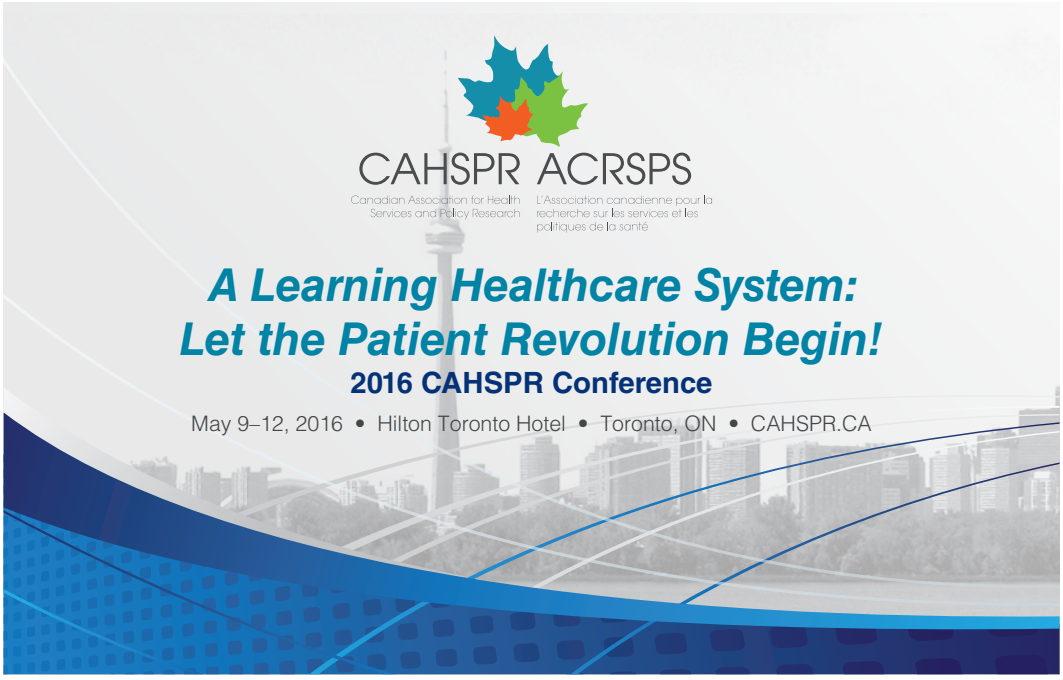
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