

ADVANCES

Impact of a standardized communication system on continuity of care between family physicians and the emergency department

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ABSTRACT

Objective: It has been suggested that continuity of care is hampered because of the lack of communication between emergency departments (EDs) and primary care providers. A web-based, standardized communication system (SCS) that enables family physicians (FPs) to visualize information regarding their patients' ED visits was developed. This paper aims to evaluate the impact of this SCS on continuity of care.

Methods: We conducted an open, 4-period crossover, cluster-randomized controlled trial of 23 FP practices. During the intervention phase, FPs received detailed reports via SCS, while in the control phase they received mailed copies of the ED notes. Continuity of care was evaluated with a web questionnaire completed by FPs 21 days after the ED visit. The primary measures of continuity of care were knowledge of ED visit (quality and quantity), patient management and follow-up rate.

Results: We analyzed a total of 2022 ED visits (1048 intervention and 974 control). The intervention group received information regarding the ED visit more often (odds ratio [OR] 3.14, 95% confidence interval [CI] 2.6–3.79), found the information more useful (OR 5.1, 95% CI 3.49–7.46), possessed a better knowledge of the ED visit (OR 6.28, 95% CI 5.12–7.71), felt they could better manage patients (OR 2.46, 95% CI 2.02–2.99) and initiated actions more often following receipt of information (OR 1.62, 95% CI 1.36–1.93). However, there was no significant difference in the follow-up rate at FPs offices (OR 1.25, 95% CI 0.97–1.61).

Conclusion: The use of SCS between an ED and FPs led to significant improvements in continuity of care by increasing the usefulness of transferred information and by improving FPs' perceived patient knowledge and patient management.

Key words: continuity of care, emergency department, family physician, follow-up

RÉSUMÉ

Objectif : On a indiqué que le manque de communication entre les services d'urgence et les fournisseurs de soins de première ligne pourrait nuire à la continuité des soins. On a mis au point sur

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le web un système de communication normalisé (SCN) qui permet aux médecins de famille (MF) de consulter de l'information sur les visites de leurs patients à l'urgence. Cette communication a pour but d'évaluer l'incidence de ce système de communication normalisé sur la continuité des soins.

Méthodes : Nous avons réalisé auprès de 23 cabinets de MF une étude ouverte et croisée à quatre périodes, randomisée et contrôlée en grappes. Pendant l'étape d'intervention, les MF ont reçu des rapports détaillés du SCN, alors qu'à l'étape de contrôle, ils recevaient par la poste copie des notes prises à l'urgence. On a évalué la continuité des soins à l'aide d'un questionnaire que les MF ont rempli en ligne 21 jours après la visite à l'urgence. Les principales mesures de la continuité des soins ont été les renseignements obtenus au sujet de la visite à l'urgence (quantité et qualité), la prise en charge du patient et le taux de suivi.

Résultats : Nous avons analysé au total 2022 visites à l'urgence (1048 interventions et 974 contrôles). Les membres du groupe d'intervention ont reçu des renseignements au sujet des visites à l'urgence plus souvent (coefficient de probabilité [CP] de 3,14; intervalle de confiance (IC) à 95 %, de 2,6 à 3,79), ont trouvé l'information plus utile (CP de 5,1; IC à 95 %, de 3,49 à 7,46), étaient mieux renseignés au sujet de la visite à l'urgence (CP de 6,28, IC à 95 % de 5,12 à 7,71), avaient l'impression de pouvoir mieux prendre en charge les patients (CP de 2,46; IC à 95 %, de 2,02 à 2,99) et ont pris des mesures plus souvent après avoir reçu l'information (CP de 1,62; IC à 95 %, de 1,36 à 1,93). Il n'y a eu toutefois aucune différence significative dans le taux de suivi par les cabinets de MF (CP de 1,25; IC à 95 %, de 0,97 à 1,61).

Conclusion : L'utilisation du SCN entre l'urgence et le cabinet du MF a produit d'importantes améliorations dans la continuité des soins, en accroissant l'utilité des renseignements transmis et en améliorant chez le MF leur perception de la connaissance du patient et leur prise en charge du patient.

Introduction

The health care system of the 21st century is characterized by a deficit in the number of health care professionals,¹ diminished access to primary care and an increasing elderly population, which in itself can often be highly complex because of polypharmacy, multiple chronic conditions, decreased functional autonomy² and complicated social issues.³ Canadians access health care mainly through family physicians (FPs) or emergency departments (EDs). Emergency departments provide care to patients with injury, acute disease and exacerbations of chronic disease, and are also used as an alternative to primary care when a family physician is unavailable.^{4,5} Part of the ED's clientele is, therefore, composed of patients who are also treated by FPs. For this reason, continuity of care between the ED and the FPs is of primary importance and is a core value of modern emergency medicine.

Continuity of care encompasses several concepts including the health care provider's awareness of their patients' conditions, the long-term relationship between the patient and the FP, a mutual trust between patient and the provider, patient satisfaction, use of preventive services, follow-up visits, diagnosis and management and collaboration between health care providers in the management and coordination of patient care.^{4,6} In the ED setting, continuity of care has been referred to as the communication of patient information between physicians of different sectors of the

health care system.⁵ As such, deficiencies in the communication of patient information between acute care facilities and FPs in the community have repeatedly been cited by health care professionals as an important contributor to the breakdown in continuity of care.^{5,7-9}

An Ontario survey found that 23% of ED chiefs perceived the quality of the patient information communicated by their ED to community physicians as unsatisfactory or inadequate and in need of improvement.⁵ Other studies have clarified that the information FPs most desire includes discharge medications (new or changes), treatments administered, laboratory test results, radiology reports, specialty consultations and follow-up plans.¹⁰⁻¹² Similarly, other studies have emphasized the importance of concise and rapid information transfer between acute care facilities and primary care providers.^{13,14} Regarding the preferred mode of communication, it has been suggested that the ideal method for information transfer would be via electronic data exchange systems.¹⁵ Implementation of electronic data exchange between hospitals, specialists and FPs, as it pertains to patients with chronic medical conditions, has already been introduced in certain settings and has been proven to be effective.^{14,16,17} However, to date, there are no published reports examining the impact of an electronic communication system between the ED and FPs as it relates to continuity of care.

Timely, accurate communication of clinical information between health care providers is essential to achieving op-

timal continuity of care. In a recent paper, we reported that the implementation of a standardized communication system (SCS) did not reduce resource use in the ED or in FPs' offices.¹⁸ The objective of this study was to determine whether the use of an SCS between the ED and FPs translates into improved continuity of care.

Methods

Design and setting

This study was conducted in Quebec, where a universal health insurance program provides complete coverage of medical and hospital services. The ED of the Sir Mortimer B. Davis–Jewish General Hospital (SMBD–JGH), a Montreal university teaching hospital with an annual ED census of approximately 60 000 visits, was the acute care facility for this study. The study design was an unblinded 4-period, crossover, cluster-randomized controlled trial of 23 FP practices. FPs were selected for recruitment on the basis of the frequency with which their patients consulted the hospital's ED; a minimum of 100 annual visits per physician clientele was required. The study received approval from the Research and Ethics Committee of the SMBD–JGH.

Intervention

The intervention was an SCS, a secure, web-based, standardized communication system that provided FPs with detailed clinical information regarding their patients' recent visits to the ED. The SCS application automatically issued daily advisory e-mails. It also issued them on an immediate basis at the request of the emergency physician. This alerted the FP to the fact that one of his or her patients had presented to the ED. The e-mail also provided a link to a secure web page where the FP could view and print a medical report detailing the ED visit. These medical reports contained the patient's name, presenting complaint, ED diagnosis, final disposition, consultant reports, laboratory results, electrocardiograms, imaging reports, discharge planning information, as well as any changes in medication regimen. In contrast, during the control periods, FPs received, by regular mail, only a carbon copy of the first page of the ED physician's notes.

Outcome assessment

We assessed continuity of care using a web-based questionnaire, sent by e-mail to FPs 21 days after their patients' ED visits. We collected data for each patient's visit and we identified improvement in continuity of care using the following measures (presented as odds ratios [ORs]):

1. higher rate of information reception;

2. more useful information;
3. better knowledge of patient's ED visit;
4. better patient management;
5. more actions initiated by FP; and
6. higher rate of follow-up visits to FP's office (ED-advised, FP-initiated or patient-initiated)

Measures 2, 3 and 4 were FP perceptions that were evaluated using a 5-point Likert scale, with 1 representing the extreme negative ("strongly disagree"), 3 representing neutrality and 5 representing the extreme positive ("strongly agree"). In addition, dichotomous outcomes are reported wherein a score of 1–3 was classified as negative while a score of 4–5 was considered positive. Measures 1, 5 and 6 were quantitative, dichotomous and needed no transformation. We accounted for the correlation of measurements within each FP cluster in all analyses. Because of the 4-period crossover study design, in the model we also included 2 lag effects (first and second crossovers from control to intervention) and 2 washout effects (first and second crossovers from intervention to control) as potential confounders. The differences in outcomes between intervention and control groups were assessed through mean differences or ORs with their corresponding 95% confidence intervals (CIs). Adjusted ORs represent the odds of an outcome associated with increased continuity of care during the intervention phase over the odds of this same outcome during the control phase. Further details on the study design, setting, location, sample size, as well as participant sampling (eligibility criteria and recruitment procedure) can be found in the primary publication of this study.¹⁸

Results

The study sample comprised a total of 2022 ED visits (1048 intervention and 974 control) and represented 1616 patients from 23 FP practices. Figure 1 is a flow diagram showing the enrolled physicians and their patients' ED visits divided into the 2 study arms. Of the 23 FPs, 21 reported baseline characteristics. Table 1 shows that 18 of the 21 FPs were men with a mean age of 54 (SD 7) years. They had been practicing medicine for an average of 24 (SD 6) years, with 43% in a group practice; each practice had an average of 4184 patient charts. Forty percent of their patients were between 40 and 69 years of age, 49% of their patients suffered from a chronic medical condition and 39% were simultaneously followed by a specialist. Table 2 shows that ED visit characteristics were similar during the intervention and control periods.

Family physician response rate was 79% for the intervention arm and 76% for the control arm. Family physi-

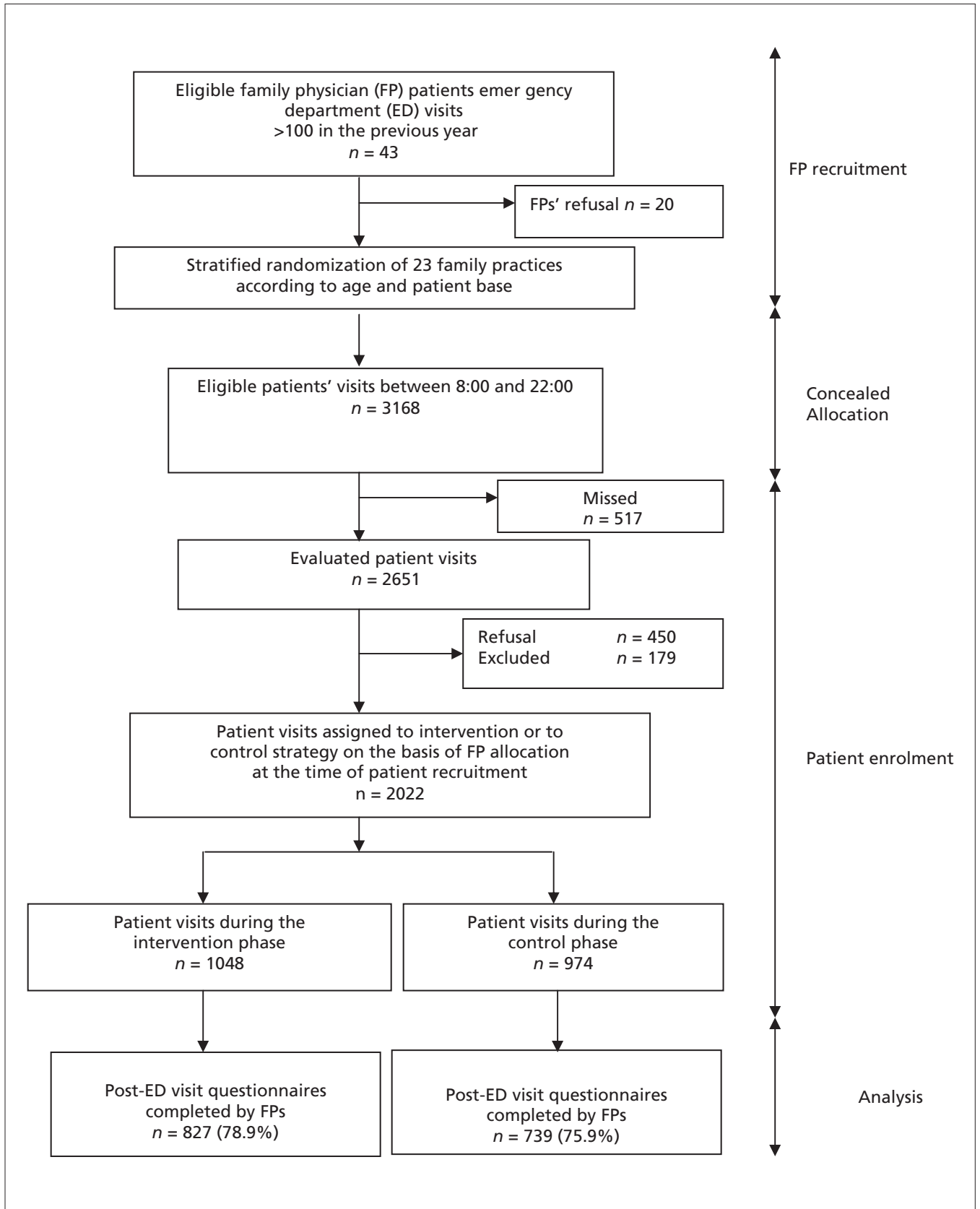


Fig. 1. Participant flow diagram (physicians and patients).

cians reported that, during intervention (compared with control) periods, ED visit information was more likely to reach them within 48 hours of the visit (66% compared with 0.5%, respectively), that information was more legible (78% compared with 28%, respectively) and that information was more comprehensive (72% compared with 14%, respectively). Figure 2 shows that 5 of the 6 continuity of care measures were statistically significant, favouring the intervention. More specifically, the intervention group received ED visit information more often (73% compared with 47%; OR 3.14; 95% CI 2.6–3.79) and found the information more useful (59% compared with 21%; OR 5.1; 95% CI 3.49–7.46). As a result, FPs stated that they had a better knowledge of their patient's ED visit (62% compared with 21%; OR 6.28; 95% CI 5.12–7.71). While in the intervention group, physicians felt they could better manage their patients (45% compared with 25%; OR 2.46; 95% CI 2.02–2.99) and that they initiated more follow-up actions upon receipt of information (32%, compared with 19%; OR 1.62; 95% CI 1.36–1.93). Calling patients at home was the most frequently cited follow-up action, but others included phoning the ED, phoning the hospital to obtain pending results, arranging urgent or fol-

low-up appointments, or visiting their admitted patients. FPs in the intervention group also reported a statistically insignificant increase in patient follow-up visits after ED care (17% compared with 14%; OR 1.25; 95% CI 0.97–1.61).

Discussion

In April 2001, the Canadian government established the Commission on the Future of Health Care in Canada. Roy Romanow, head of the Commission, had the mandate to engage Canadians in a national dialogue on the future of health care and to make recommendations to preserve the long-term sustainability of Canada's universally accessible, publicly funded health care system. A key recommendation in the Romanow Report, arising from the Canadian emergency medicine community, stated that "the electronic transfer of information to and from the emergency department, the community family physician, and other institutions is vital and perhaps the greatest priority. In fact we would suggest that without the initial implementation of electronic information systems in emergency departments, the link between the community and the hospital will not exist and the integration of hospital and community cannot occur."¹⁹

When a patient leaves the ED, 2 things have changed: the patient's state of health and the current information about that state. Published literature and consultations with FPs suggest that ED information rarely accompanies patients, and this dissociation contributes to a loss in continuity of care.^{5,7-9} In this study, measures of continuity of care focused on communicating patient information between the ED and the FP. Benefits of an SCS were reflected by a higher rate of information transfer, more useful information, better knowledge of the patient visit and better patient management. The higher number of follow-up visits when using the SCS mirrors the existing litera-

Table 1. Baseline characteristics of participating family physicians (n = 21).*

Physician characteristics	
Male sex, n (%)	18 (85.7)
Mean age in years, SD	54, 7
Solo practice, n (%)	12 (57.1)
Group practice, n (%)	9 (42.9)
Experience with computers, n (%)	
None	3 (14.3)
Little	2 (9.5)
Moderate	13 (61.9)
Much	3 (14.3)
Receives mailed summaries from ED, n (%)	20 (95.2)
Receives mailed summaries within 2 weeks, n (%)	9 (42.8)
Practice characteristics	
Years of practice, mean, SD	24, 6
Mean proportion of patients followed by specialist, %	38.9
Mean proportion of patients aged, %	
<40 years	26.8
40–69 years	39.8
70–79 years	22.3
≥80 years	10.6
Mean proportion of patients with chronic medical conditions, %	49.2

*21 out of 23 family physicians reported baseline characteristics
ED = emergency department; SD = standard deviation

Table 2. Characteristics of ED patient visits.

Characteristic	Intervention group (n = 1048)	Control group (n = 974)
Female sex, n (%)	611 (58.3)	551 (56.6)
Arrived by ambulance, n (%)	221 (21.1)	194 (19.9)
Patient age (years), mean, SD	62.1, 20.3	62.1, 20.4
Triage level 1 or 2, n (%)	276 (26.3)	280 (28.7)
Top 3 presenting complaints, n (%)		
Chest pain	117 (11.2)	138 (14.2)
Abdominal pain	100 (9.5)	97 (9.9)
Dyspnea	76 (7.3)	79 (8.1)

ED = emergency department; SD = standard deviation

ture, which states that a higher number of follow-up visits is considered to reflect an improvement in continuity of care. This can be explained by the fact that follow-up visits empower FPs to know their patient better,¹⁸ to reduce the risk of emergency revisits and readmissions,²⁰ and to enable FPs to play a more active role in coordinating patient care.¹ Moreover, a recent publication reporting the impact of SCS on resource use also demonstrated a trend toward a reduction in ED visits, particularly for the elderly patients.¹⁸ The finding that more actions were undertaken by FPs could be explained by FPs gaining new knowledge about their patients, which, in turn, prompted more actions (telephone calls, blood work, consultations, imaging) concerning previously unknown, at least in the short-term, medical problems.²¹

The current study demonstrates that continuity of care is enhanced by improving the transfer of clinical information between the ED and family practices. All measures of continuity of care except the follow-up visit rate showed statistically significant differences favouring the intervention. Based on FP perceptions, the information transfer provided better and more useful knowledge of their patients' ED visits, resulting in improved follow-up and pa-

tient management. Further, our study demonstrates that timely, secure and reliable electronic communication between an ED and FPs is not only feasible, but also desirable and welcomed by FPs. FP feedback revealed that the SCS intervention allowed them to prioritize which patients to see, to be more effective and efficient in coordinating care, to reduce language barriers with regard to accurately describing investigative procedures and treatments received in ED, and, most importantly, to humanize care by reassuring patients about procedures done in the ED. Better information transfer to FPs empowers them to fulfill their role as primary health care providers. This is a concern for decision makers.

Our results are consistent with published literature demonstrating that enhanced information transfer to health care providers is closely associated with increased continuity of care for elderly patients,²² psychiatric patients²³ and patients with chronic conditions.^{24,25} Previous literature also indicates that continuity or integration of care is associated with increased quality of care.²⁶ When continuity of care was improved, patients with chronic conditions, such as diabetes²⁷ and asthma,²⁸ were found to be more stable; the likelihood of patients complying with

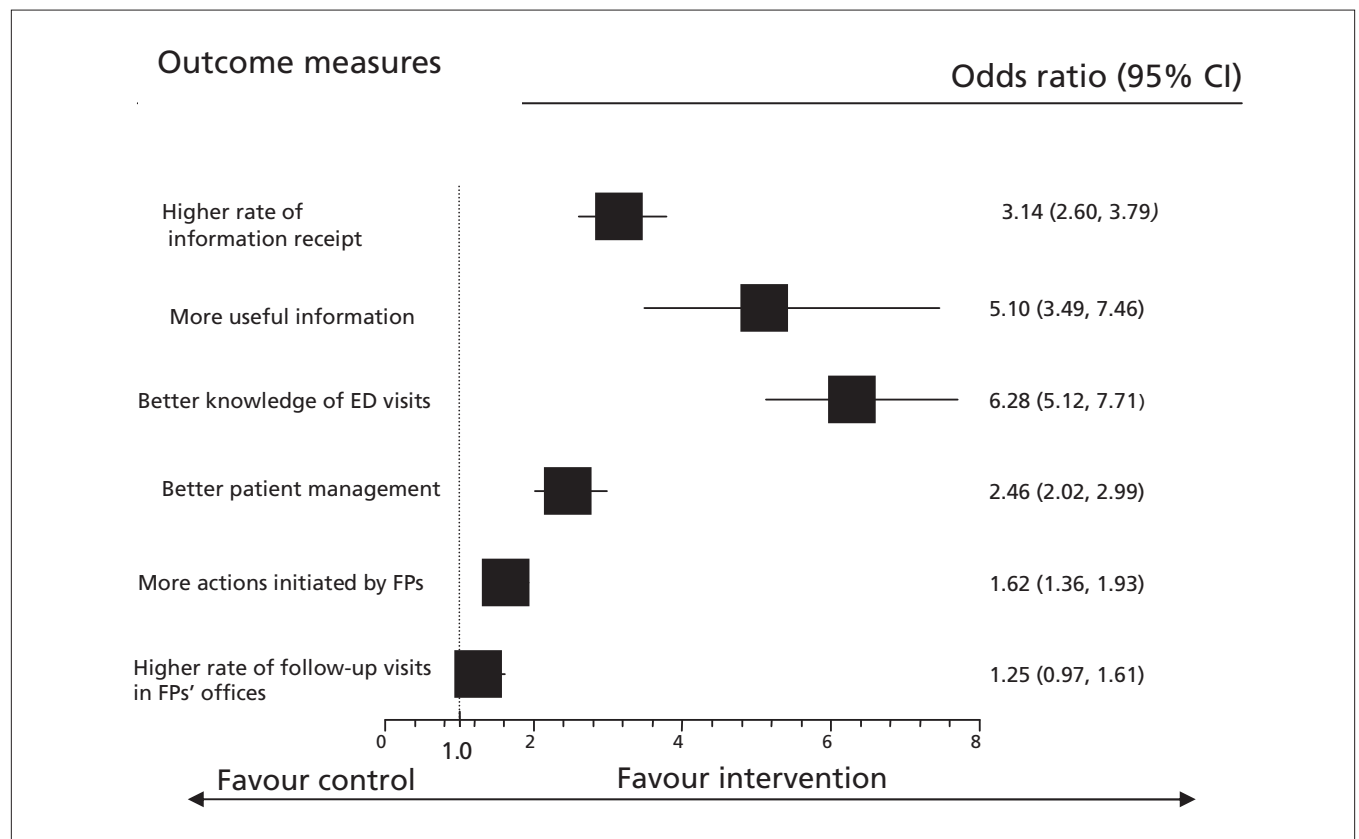


Fig. 2. Adjusted odds ratios of measures of continuity of care. CI = confidence interval; ED = emergency department; FP = family physician.

their prescribed treatments was higher²⁹; preventive care including immunization was enhanced³⁰; and fewer adverse drug related events occurred in the ED.³¹

Despite the fact that we used an intention-to-treat approach and a strong comparator (mailed copy of ED note), which both tend to reduce the apparent treatment effect, the intervention still showed a significant benefit over the control group with regard to continuity of care.

Limitations

This study was conducted at a single site because the technological infrastructure and investments required were too costly to engage in a multicentre trial. Therefore, the current results could be associated with the fact that the FPs were all affiliated with the same hospital or had a similar type of practice. Sample size and power calculations were based on the primary outcome of resource use,¹⁸ so the failure to find statistically significant differences on FP follow-up after the ED visit could be explained by the lack of power. During the study period, for ethical reasons, the standard SMBD–JGH practice of mailing FPs a carbon copy of the first page of the ED note was not suspended. This may have led us to underestimate the impact of the intervention. Finally, this study assessed continuity of care using 6 measures; however, there are other indicators of continuity of care that we did not consider.

Conclusions

Although standardized communication systems may not decrease resource use,¹⁸ this analysis demonstrates that timely and relevant information communicated from the ED to the FP positively impacts continuity of care according to FP perceptions. The intervention was well received by FPs and led to significant improvements in patient management through more informed decision-making. It is likely that improved continuity of care across primary and acute care facilities would simultaneously and positively impact quality of care.

Additional multicentre trials are still needed to determine the wider scope and applicability of these benefits and to monitor markers of quality of care. Finally, in order to evaluate the impact of an intervention on continuity of care, over and above the required financial investments, it is essential to pre-define the specific outcomes necessary to measure and engage all stakeholders (physicians, health care institutions and decision makers) to guarantee the adequate evaluation of the intervention.

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