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Improving Transitional Care for Older Adults: Results of a Patient-Centred Quality Improvement Intervention

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Résumé

L'objectif de l'étude était d'évaluer la mise en œuvre et les résultats d'une intervention d'amélioration de la qualité du suivi des patients âgés qui retournent à domicile après une hospitalisation, basée sur un outil éducatif – le **P**lan de **c**ongé **a**xé sur le **p**atient (PCAP). Une évaluation du PCAP avant et après sa mise en œuvre a été réalisée auprès de patients de 65 ans et plus ayant reçu leur congé après une hospitalisation dans les services de médecine et de gériatrie de deux hôpitaux généraux. Deux cohortes de patients – avant et après le PCAP – ont été analysées à l'aide de données administratives (n = 3309) et des entretiens structurés post-congé ont été menées auprès d'un sous-groupe de patients (n = 326). Les critères d'évaluation de l'étude étaient la réadmission et les retours aux urgences dans un délai de 90 jours après le congé, et l'expérience de transition (échelle de 10 critères). Le PCAP a été fourni à 20 % du groupe de 1683 sujets. L'expérience de transition a été améliorée dans les deux hôpitaux [bêta ajusté 1,3 (IC à 95 % – 0,8, 1,7)], et les retours aux urgences ont diminué pour l'un des deux hôpitaux [diminution du taux ajusté de 1,3 % (IC à 95 % – 3,7, 6,2)]. En conclusion, des ressources dédiées sont désormais nécessaires pour de futures mises en œuvre de l'outil PCAP.

Abstract

The objective of this study was to evaluate the implementation and outcomes of a quality improvement intervention for older adults discharged from hospital to home, that used a patient-centred discharge education tool called the *Patient-Centered Discharge Plan (PCAP)*. We conducted a pre–post evaluation of PCAP implementation among patients 65 years and older and discharged home from an acute medical or geriatric admission at two general hospitals. Two patient cohorts, PRE and POST, were analysed using administrative data (*n* = 3,309) and post-discharge structured interviews in a subset of patients (*n* = 326). Outcomes were 90-day readmissions and return emergency department (ED) visits, and transition experiences (10-item scale). The PCAP was provided to 20 per cent of 1,683 patients. Transition experience scores increased from PRE to POST at both hospitals (adjusted beta 1.3; 95% CI: 0.8, 1.7), and return ED visits declined in one of the two hospitals (adjusted decline 1.3%; 95% CI: -3.7, 6.2). In conclusion, dedicated resources are needed to support future PCAP implementation.

Introduction

Transitional care from an acute care hospitalization back home is important among vulnerable older adults to prevent morbidity, mortality, and readmission (Le Berre, Maimon, Sourial, Gueriton, & Vedel, 2017). Many older adults suffer from one or more chronic conditions requiring prescription medications, experience cognitive and/or functional deterioration, and require assistance from family members to carry out daily activities (Public Health Agency of Canada, 2020). An acute hospital admission may be a source of stress, requiring changes in medications and other treatments, and additional assistance from family and health care providers (Coleman & Berenson, 2004; World Health Organization, 2016). Readmissions can result from inadequate preparation for return home, which requires patient and family education on changes in medications and self-management, as well as need for primary care

and home care (Albert, 2016; Allen, Hutchinson, Brown, & Livingston, 2014). Meta-analyses demonstrate that enhanced transitional care services can reduce mortality, return emergency department (ED) visits, and readmissions for the three months after discharge and even longer (Le Berre et al., 2017). Inclusion of the family caregiver in transitional care further reduces rates of readmission (Rodakowski et al., 2017).

Traditional discharge planning interventions often include discharge summaries for the primary care team. Instructions for patients may be uncoordinated among members of the health care team or absent altogether. Efforts to improve patient/family pre-discharge education have included tools and guidelines for health care providers and checklists for patients. Few studies investigate patient or family experiences of transitional care beyond assessing satisfaction (Allen et al., 2014). Furthermore, a recent scoping review called for more research on intervention components that engage caregivers, involve multidisciplinary teams, and address patient/caregiver needs (Liebzeit, Rutkowski, Arbaje, Fields, & Werner, 2021).

Patient-centred discharge tools provide an opportunity to engage patients. A systematic review of these tools found that they can increase comprehension but that further research is needed on patient experience and adherence to instructions (Okrainec et al., 2017). Project RED (ReEngineered Discharge) in the U.S. reported a positive impact on perceptions of instructions on self-care (Cancino et al., 2017). The TRANSITION tool from Australia is another tool designed to facilitate communication between nurses and older acute-care patients (Allen, Hutchinson, Brown, & Livingston, 2020). A promising approach to improving patient-centred discharge education is the Patient-Oriented Discharge Summary (PODS), co-developed by patients and health professionals in ON, Canada (Hahn-Goldberg et al., 2016; Hahn-Goldberg, Okrainec, Huynh, Zahr, & Abrams, 2015). The PODS was implemented in 21 ON hospitals that had a high level of organizational commitment and readiness (Hahn-Goldberg et al., 2021). A "community of practice" model was used for implementation in which teams came together for learning, sharing, and guidance. The project managed to implement the PODS among 64 per cent of patients, and there was evidence of improved discharge processes (Hahn-Goldberg et al., 2021). However, patient-reported experiences (understanding of medications and what to do if worried about their condition) and health service utilization did not improve.

In this evaluation project, we implemented a quality improvement (QI) intervention that focused on enhancing transitional care experiences and reducing readmission and return ED visits through use of a patient-centred discharge tool adapted from the PODS. Our study objectives were: (a) to describe implementation of the discharge tool in two general hospitals; (b) to compare transition experiences and three-month readmissions from before to after implementation of the discharge tool; and (c) to compare, after implementation, transition experiences and readmissions between those who did versus did not receive the tool.

Methods

The study used a PRE–POST design, comparing cohorts of patients at the two participating study hospitals before (October 2018 to March 2019) and after (April to December 2019) implementation of the patient-centred discharge tool. (These time frames are approximate and differ at each participating unit).

After completion of the PRE phase, there was a period of several weeks at each unit to allow for staff training and pilot-testing (see *Intervention* section below) before the POST period began with formal implementation of the intervention. The study protocol was approved by the local Research Ethics Committee.

Settings

The project was conducted at two urban, community acute-care hospitals (A and B) in the West Island of Montreal (Canada) serving a multicultural, multilingual population generally underserviced by primary care physicians. (We have blinded the hospitals at the request of participants to avoid invidious comparisons between them). Both hospitals are university affiliated, although the affiliation is more robust at Hospital B, which has a research centre and a longer history of participation in research. At each hospital, three units – two medical and one geriatric units – participated in the project. At Hospital A, the geriatric unit was a mixed medical-geriatric unit, whereas, at Hospital B, the geriatric unit was exclusively a geriatric assessment unit with established protocols for patient care.

Patient Samples

We identified two patient cohorts, PRE and POST implementation, from institutional administrative databases at both hospitals, comprising patients ages 65 and over, discharged home from any of the participating hospital units. We used these administrative data cohorts to analyse changes from PRE to POST in readmissions and return ED visits, and to estimate overall rates of use of the discharge tool and patient characteristics associated with use.

We also recruited patient subsamples to be interviewed at both hospitals during both PRE and POST implementation to assess patient experiences of transitional care following discharge. To do so, research assistants (RAs) used admission logs to systematically identify eligible patients (ages 65 and over, living at home prior to hospitalization) who had been admitted to the six target units. RAs approached these patients while they were on the unit to recruit them into the study and proceed with baseline data collection. Actual discharge destination was sometimes unknown at the time of recruitment; any enrolled patients who ended up being discharged to locations other than their home (nursing home, rehabilitation, or convalescent facility), or who were still in a hospital at the end of the active study period, were withdrawn from follow-up. In the case of physical or mental incapacity, the main caregiver (unpaid family member or friend) was invited to participate as a proxy respondent for the patient. Nursing staff asked the RAs to refrain from approaching patients in isolation or those with severe behavioural issues.

Intervention

The QI intervention was initiated by a clinical partner committee with the support of researchers with relevant experience in optimizing older adult care. The goal of the QI intervention was to improve patient flow and avoid return ED visits and readmissions by targeting patient education in preparation for discharge. Current practice was to provide patients at discharge with an envelope (containing follow-up appointment cards) and instructions by individual members of the multidisciplinary care team. The committee agreed that the intervention should focus on improving

patient education and take the form of a clear, simple, one-page sheet of key information needed by patients/families at home in lay language. The intent of this sheet also would be to help structure the verbal information related to discharge provided to the patient or caregiver during the hospitalization, to help clinical staff ensure that information provided was complete, and to provide a simple written record to improve retention and facilitate follow-up for patients once they were back home. With this in mind, a review of different discharge education tools that used this format was undertaken, and the PODS was the closest match to the committee's requirements. Several aspects of the PODS required changes to match the needs of the local context and to avoid duplication of effort. This adaptation was done with input from hospital- and community-based nurses, physicians (family medicine and geriatrics), multidisciplinary health professionals, and members of the local technology assessment team (see Acknowledgments section for departments and selected individuals who participated in this project). The resulting discharge education tool was named the *Patient-Centered Discharge Plan (PCAP)* (*Plan de Congé Avec le Patient* in French) (Appendix 1). Briefly, the PCAP differed from the PODS in the following ways:

1. The PODS has a section for listing all medications; for PCAP, the clinical staff asked that we instead make use of the pharmacy printouts already prepared for patients. The pharmacy printouts were stapled to the PCAP forms, and a checkbox on the PCAP forms alerted patients to the need to bring new prescriptions to the pharmacy.

2. The PODS includes a section on symptoms/side effects to expect from treatments and procedures with instructions on when to go to the ED. Staff preferred that we remove this section and instead include more space in the section on changes to the routine.

3. Because home care services in Quebec are delivered by government local community service centres (CLSCs) for health and social services, the PCAP includes a large section on CLSCs, following the request of clinical partners who felt this was information patients are often missing when they return home.

4. Rather than list the appointments directly on the PCAP (as the PODS does), clinical staff asked that we make use of appointment cards that were already used on the units and staple them to the PCAP forms. Here again, we opted to use a checkbox alerting patients to attached appointment cards and a reminder of appointments that still need to be booked.

Before formal implementation, the PCAP was piloted by selected nurses in 18 patient discharges and feedback was sought from patients/caregivers (*n* = 8) interviewed after discharge and from the nurses (*n* = 2). Feedback was used to improve the layout of the tool (revised font to improve readability and visual appeal, increased/decreased space for different sections, inclusion of dedicated space for use of hospital addressographs) and the follow-up questionnaire (see *Data Collection*, below).

Champions at each hospital introduced the PCAP to unit managers and/or head nurses on target units and worked with them to develop training materials for its implementation. These included data on patient experiences of discharge from the pre-implementation phase of the project (see below) to illustrate the common gaps in knowledge that patients/caregivers report after discharge. Written instructions and other visual supports describing how to fill out the PCAP were created and provided to the clinical staff on the participating units. Each manager assigned

responsibility for PCAP completion to specific nurses on the unit and conducted training sessions with their staff. Multidisciplinary staff (e.g., occupational therapists and physiotherapists, nutritionists) who operated across units were trained by a designated team lead to work with nurses to ensure their instructions would also be included in the PCAP. Nurses were expected to complete the PCAP progressively over the course of the hospitalization in collaboration with the patient and caregiver and review all the completed contents with them prior to issuing the completed copy at discharge. Carbon copies of completed PCAPs were deposited by nurses in designated boxes in the nursing stations, to be collected by RAs on a weekly basis.

Following the formal launch of implementation, an RA provided weekly feedback to unit managers and head nurses on the numbers of carbon copy PCAP forms collected, along with information on how well the forms were being completed (e.g., if specific sections were not being completed). The evaluation coordinator also provided regular e-mail updates to unit managers. This information was intended to be shared with staff and to improve PCAP completion.

Data Collection

Hospital administrative databases were used to extract demographic and clinical data for admissions during the 12 months before the index admission (age, sex, date of discharge, unit of discharge, length of hospital stay, and discharge diagnoses), which were used to compute the Charlson Comorbidity Index (D'Hoore, Bouckaert, & Tilquin, 1996), as well as the number of hospital admissions and ED visits without hospital admission, both during the 6 months before and the 90 days after the index discharge. The primary discharge diagnosis at the index visit was also used as a potential covariate.

For patients in the interviewed samples, the RA conducted a short baseline interview immediately after recruitment on the unit to collect the following patient information: level of education, language, country of birth, receipt of CLSC home care services. The six-item Identification of Seniors at Risk – Revised (ISAR-R) was administered as a brief measure of function that is a predictor of readmission (McCusker, Warburton, Lambert, Belzile, & De Raad, 2022; Warburton, 2005). The ISAR is strongly correlated with pre-morbid activities of daily living (Dendukuri, McCusker, & Belzile, 2004; McCusker et al., 1999). The ISAR score was used only as a covariate in the current study; the results were not disclosed to clinical staff.

During the week after discharge (or as soon as possible thereafter), designated RAs, blinded on whether a PCAP had been completed, telephoned participants who had been discharged home to ask about their recollection of transition experiences topics covered by the PCAP (see Tables 4 and 5 for topics covered). Some of the questions were adapted from those used previously (Hahn-Goldberg et al., 2015). After pilot-testing, we chose questions that used a straightforward conversational style to determine whether respondents recalled being informed about key topics addressed by the PCAP. (Participants were not asked directly whether they received a PCAP.) We also computed a summary transition experience scale from the 10 items. Each item was scored 1 = Yes or 0 = No/don't know (see Appendix 2 for questions and scoring), with the summary scale ranging from 0 to 10 – a higher score indicating recollection of more topics.

We were unfortunately unable to conduct a preplanned survey or conduct interviews with hospital staff about their experiences

with PCAP implementation due to the disruptions related to the coronavirus disease (COVID-19) pandemic and subsequent staff reallocations.

Statistical Analysis

In preliminary analyses, for a description of the cohorts and to help in the selection of covariates for multivariable analyses, we compared characteristics of the total and interviewed samples PRE and POST, using the standardized difference (Yang & Dalton, 2012). We used the same approach to compare characteristics of patients in the POST cohorts who received versus did not receive a PCAP. Any variables with a standardized difference of 0.15 or more were considered as covariates for the appropriate sample and comparison.

To examine patient characteristics related to selection by unit staff to receive a PCAP (based on collected carbon copies of PCAP forms), in the POST cohort, we conducted univariate and multivariable logistic regressions (Hosmer & Lemeshow, 1989), separately by hospital for all available patient baseline variables. Odds ratios with their 95 per cent confidence intervals (CI) were computed. We then compared 90-day readmissions and return ED visits without admission in the PRE versus POST cohorts separately by hospital using the risk difference (RD) and its 95 per cent CI, with and without adjustment for selected covariates (see covariate selection above); RDs were computed from the estimates obtained from logistic regression (Austin, 2010). We used the same approach to compare 90-day readmissions and return ED visits by hospital among those in the POST cohort who received versus did not receive a PCAP.

The effects of study cohorts (PRE and POST) on patient experiences were tested with logistic regression for each binary experience item and with linear regression (Neter, Wasserman, & Kutner, 1985) for the total transition experience score (0 to 10) in the interviewed samples only. Each model included as covariates: hospital, hospital unit (medicine/geriatric), and covariates with a standardized difference of 0.15 or greater, shown in Table 1. For the transition experience score, an interaction term between the hospital and the cohort was added to the model; if this term was significant at alpha 0.1, stratified analyses by hospital were conducted. The RD and 95 per cent CI were computed from the estimates of the logistic regression – the Beta estimate from the linear regression. We used a similar approach to compare the effects of PCAP receipt in the POST cohort on transition experiences.

All the regression analyses were conducted in consideration of the standard assumptions required, which were met (Hosmer & Lemeshow, 1989; Neter et al., 1985). Data overfitting in regression models were assessed with author Harrell's recommendations (Harrell, 2001). In case of overfitting, variable selection using the backward elimination technique (stopping rule: residual χ^2) was performed to reduce the number of variables. The missing values in the interview sample were negligible (two missing for home care services recoded as "no services"). All analyses were performed with SAS University Edition, SAS version 9.4 and STATA 15.

Results

Sample Characteristics and Covariate Selection

During the PRE and POST periods, 1,626 and 1,683 patients, respectively, ages 65 years and over, were discharged home from the six study units (after removal of duplicates) and comprised the total study sample. A subset 215 patients/caregivers were recruited into the PRE interview sample and 270 to the POST interview sample. Consent rates among eligible patients/caregivers were 78.5 per cent at PRE, falling to 61.8 per cent at POST. Of these, 36 at PRE and 59 at POST were withdrawn as they were not discharged home. Among the 179 at PRE and 211 at POST eligible for follow-up, interviews were completed by 147 (82.1%) at PRE and 179 (84.8%) at POST. (See flowcharts for interviewed sub-samples in Appendix 3.)

Table 1 shows the differences between the PRE and POST cohorts in both the total sample and the interviewed sub-samples, using the standardized difference of 0.15 or greater as the criterion for important differences. In the total sample, the POST cohort was less likely to have a respiratory discharge diagnosis, presumably because of greater recruitment during the summer months. The POST cohort in the total sample also had shorter average unit stays. In the interviewed sub-samples, one of the medical units during the POST period was closed to the RAs because of an outbreak of vancomycin-resistant enterococcus on the unit. The POST cohort was also slightly younger than the PRE cohort, more often female, had a higher Charlson Comorbidity Index (CCI) score, differences in several discharge diagnoses, a somewhat longer delay between discharge and interview, and a lower mean ISAR score.

Analyses in the Total Sample

PCAP completion rates (assessed using the collected carbon copies) during the POST period were 252/924 (27.3%) in Hospital A and 85/759 (11.2%) in Hospital B. The PCAP completion varied by unit: 20 and 22 per cent in the medical units and 40 per cent in the geriatric unit in Hospital A; 0 and 4 per cent in the medical units and 55 per cent in the geriatric unit in Hospital B. The completeness of information in the PCAP forms also varied by hospital: Hospital B's PCAP forms were more complete, with only 13 per cent of forms having three or more information fields not filled in versus 58 per cent of PCAP forms in Hospital A. RAs observed during their weekly visits to the clinical units that PCAPs were often completed just before discharge without involvement of the patient, and given to patients at discharge along with other documents without accompanying discussion or patient education. RAs observed that nursing staff frequently referred to the project as a *research project*, despite it being presented as a partnership-driven QI intervention during training and in the support materials and instructions.

Table 2 shows patient characteristics associated with receiving a PCAP in the POST cohort. In Hospital A, multivariable regression models indicated that PCAP completion was associated with discharge from the geriatric unit, younger age, male sex, a diagnosis of a circulatory or respiratory disorder, or symptoms/signs, a shorter length of stay on the unit, and with a hospital admission in the previous six months. At Hospital B, discharge from the geriatric assessment unit, a diagnosis of a symptoms-signs, or an infectious-parasitic disorder was associated with PCAP completion in multivariable analysis (reduced model).

Table 3 shows health service outcomes at each hospital in the total sample. At Hospital A, the readmission risk did not change from PRE to POST (25.3% in both periods), but there was a reduction in return ED visits from 15.4 to 11.9 per cent, which was statistically significant in both unadjusted and adjusted

Table 1. Administrative and interview baseline variables in total sample and interviewed sub-sample, PRE and POST

Baseline variables	Total sample (n = 3309)			Sub-sample (n = 326)		
	PRE	POST		PRE	POST	
	(n = 1626)	(n = 1683)	Standardized difference	(n = 147)	(n = 179)	Standardized difference
Administrative data:						
Hospital, %			0.02			0.02
A	54.1	54.9		50.3	49.2	
B	45.9	45.1		49.7	50.8	
Unit, %			0.11			**0.41**
Acute medical	78.2	73.7		87.8	71.5	
Geriatric	21.8	26.3		12.2	28.5	
Age, mean (SD)	83.1 (8.5)	82.2 (8.5)	0.11	81.8 (8.0)	80.4 (8.1)	**0.17**
Female, %	58.4	61.1	0.06	49.7	60.9	**0.23**
Charlson Comorbidity Index, mean (SD)	2.5 (2.2)	2.3 (2.2)	0.09	2.3 (2.1)	1.9 (1.8)	**0.21**
Primary discharge diagnosis, %						
Infectious and parasitic	3.0	4.7	0.09	4.1	5.0	0.04
Endocrine, nutritional and metabolic	3.0	2.8	0.01	5.4	2.2	**0.17**
Mental and behavioural	9.4	7.1	0.08	2.0	7.8	**0.27**
Circulatory system	16.7	17.1	0.01	24.5	17.3	**0.18**
Respiratory system	23.3	14.6	**0.22**	21.1	13.4	**0.20**
Digestive system	6.6	8.0	0.05	6.1	9.5	0.13
Musculoskeletal	5.2	6.5	0.06	4.8	7.8	0.12
Genitourinary	6.5	7.9	0.05	6.1	10.1	**0.15**
Symptoms, signs	8.7	12.1	0.11	8.8	9.5	0.02
Injury, poisoning	5.4	7.1	0.07	2.7	6.2	**0.17**
Any other diagnosis	12.2	12.1	0.00	10.9	10.1	0.03
Length of stay on unit (days), mean (SD)	7.2 (8.7)	6.9 (8.6)	**0.35**	10.3 (9.0)	10.9 (10.0)	0.07
Admission past 6 months, %	16.3	15.7	0.02	21.1	21.2	0.00
ED visit past 6 months*, %			0.05			0.14
0	76.9	74.6		81.0	74.9	
1	16.0	18.3		16.3	20.7	
2+	7.1	7.1		2.7	4.5	
Interview data:						
Days from interview to discharge, mean (SD)		NA		7.5 (5.9)	8.9 (7.3)	**0.22**
Respondent, patient (vs. caregiver) %		NA		75.5	71.5	0.09
Born in Canada, %		NA		59.2	59.2	0.00
High school completion, %		NA		66.0	72.6	0.14
Home care services, %		NA		29.9	24.6	0.12
ISAR score, mean (SD)		NA		2.3 (1.3)	2.1 (1.4)	**0.15**

Notes.
*Emergency Department (ED) visit without admission in the previous 6 months.
Standardized differences of 0.15 or more are shown in bold font.
NA = not available.

analyses. At Hospital B, the changes in both outcomes were small and not statistically significant.

Differences in health service outcomes between those in the POST cohorts who did versus did not receive a PCAP are also shown in Table 3. At Hospital A, those patients with a PCAP had a higher risk of readmission than those without a PCAP (31% vs. 23.5%), but the difference was not significant after the adjustment for covariates. At Hospital B, the PCAP group also had a higher risk of readmission compared to those without a PCAP, that was not significant in unadjusted or adjusted analyses. However, the confidence intervals at Hospital B are wide due to the relatively small number of patients who received a PCAP (n = 85).

Table 2. In the POST cohort, associations between patient characteristics and PCAP use, by hospital

	Logistic regression (Outcome: PCAP [reference: no PCAP])			
	Hospital A (n = 924, PCAP [*n* = 252])		Hospital B (*n* = 759, PCAP [*n* = 85])	
	Unadjusted models	Adjusted models	Unadjusted models	Adjusted models (after reduction)
Outcomes/variables	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Unit				
Acute medical	1.00	1.00	1.00	1.00
Geriatric	**2.57 [1.91; 3.47]**	**3.27 [2.36; 4.54]**	**56.7 [29.7; 108.3]**	**113.20 [47.10; 272.05]**
Age	**0.98 [0.96; 0.99]**	**0.98 [0.96; 0.99]**	**1.03 [1.01; 1.06]**	0.96 [0.93; 1.00]
Female	**0.68 [0.50; 0.91]**	**0.71 [0.52; 0.98]**	**2.02 [1.21; 3.39]**	
Charlson Comorbidity Index (CCI)	0.97 [0.92; 1.03]	0.94 [0.88; 1.01]	1.03 [0.92; 1.16]	
Primary discharge diagnosis				
Infectious and parasitic	1.10 [0.49; 2.47]	1.22 [0.52; 2.88]	1.87 [0.44; 8.00]	**9.90 [2.47; 39.69]**
Endocrine, nutritional, and metabolic	1.87 [0.79; 4.41]	1.87 [0.74; 4.72]	0.91 [0.10; 8.69]	
Mental and behavioural	0.90 [0.45; 1.81]	0.79 [0.37; 1.66]	**7.77 [2.36; 25.57]**	
Diseases of the circulatory system	**2.06 [1.19; 3.58]**	**2.26 [1.25; 4.10]**	0.72 [0.21; 2.47]	2.41 [0.83; 7.03]
Respiratory	**2.28 [1.33; 3.92]**	**2.49 [1.39; 4.47]**	0.24 [0.04; 1.37]	
Digestive	1.24 [0.64; 2.43]	1.17 [0.57; 2.38]	0.48 [0.08; 2.70]	
Musculoskeletal	1.45 [0.66; 3.15]	1.44 [0.63; 3.31]	**5.33 [1.69; 16.79]**	
Genitourinary	1.31 [0.69; 2.48]	1.33 [0.67; 2.64]	1.54 [0.39; 6.07]	
Symptoms, signs	1.66 [0.95; 2.91]	**1.99 [1.08; 3.65]**	3.06 [0.96; 9.74]	**2.42 [0.94; 6.25]**
Injury, poisoning	0.63 [0.30; 1.35]	0.70 [0.31; 1.57]	**4.98 [1.47; 16.94]**	
Any other diagnosis (reference)	1.00	1.00	1.00	1.00
Length of stay on unit (days)	**0.97 [0.94; 0.99]**	**0.96 [0.94; 0.99]**	1.01 [0.99; 1.04]	
ED visit past 6 months*	1.05 [0.90; 1.23]	1.03 [0.87; 1.22]	1.13 [0.86; 1.48]	
Admission past 6 months	**2.15 [1.53; 3.03]**	**2.09 [1.43; 3.06]**	1.70 [0.91; 3.18]	1.76 [0.72; 4.32]

Notes.
*Emergency Department (ED) visit without admission in the previous 6 months; OR: odds ratio.
OR for continuous variable (ordinal) variables is computed for an increase of 1 unit.
Confidence intervals excluding 1 shown in bold font.

Results in the Interviewed Samples: Transition Experiences

Table 4 shows transition experiences in the PRE and POST interviewed samples that combined data from the two hospitals for ease of presentation. There were significant improvements from PRE to POST in four of the experience items: opportunity to ask questions (increase of 13.7%), received written instructions (increase of 35.6%), information on symptoms (increase of 14.1%), and information on follow-up appointments (increase of 26.7%), as well as an increase in the overall transition experience score at both hospitals. The interaction term between time and hospital was non-significant (*p* value was 0.148), indicating a similar effect at the two hospitals.

Table 5 shows the transition experience measures during the POST periods in the interviewed sub-samples among those with versus without a PCAP. (The multivariable models adjusted for covariates with a standardized difference of 0.15 or greater when comparing those with vs. without a PCAP [see Appendix 4].) After adjustment for covariates, patients/caregivers who had received a PCAP were significantly more likely to report that they had received written instructions (difference of 21.1%) and that they understand their medications (difference of 20.4%: the unadjusted results for the latter show the opposite effect, due to confounding by

covariates). There was no significant difference in the total experience score in the combined sample. There was, however, a significant interaction by hospital; the unadjusted experience score was higher in PCAP recipients than in non-recipients at Hospital A, but, in Hospital B, experience scores were higher in those without a PCAP versus those with a PCAP. However, neither of the stratified beta estimates were significant.

Discussion

This study evaluated the effects of a transitional care intervention that used a patient-centred tool, the PCAP, in a PRE and POST study. We found that, despite lower-than-expected implementation of the PCAP, the intervention overall resulted in improved transition experiences, suggesting that the staff training on PCAP changed staff behaviour in preparation for patient discharge, even if the PCAP itself was not completed, perhaps due to time constraints. One hospital experienced a reduction in three-month return ED visits, possibly related to improved discharge practices.

Our study investigated the implementation of PCAP in a real-world setting, as part of a QI effort that aimed to reduce hospital readmissions. Previous implementation research with the PODS

Table 3. Readmissions (90-day) and ED visits, comparing PRE and POST cohorts and POST cohort with and without a PCAP, by hospital (Total sample, *n* = 3,309)

	Logistic regressions					
	Hospital A (*n* = 1,803)			Hospital B (*n* = 1,506)		
		Readmission	Return ED visit		Readmission	Return ED visit
Outcomes	N	%	%	N	%	%
Study phase						
PRE	879	25.3%	15.4%	747	20.6%	12.6
POST	924	25.3%	11.9%	759	17.4%	15.7
Difference [95% CI]						
Unadjusted		0.0 [−4.0; 4.1]	**−3.5 [−6.6; −0.3]**		−3.2 [−7.2; 0.7]	3.1 [−0.4; 6.6]
Adjusted[1]		0.0 [−4.0; 4.0]	**−3.4 [−6.6; −0.2]**		−3.3 [−7.3; 0.7]	3.0 [−0.6; 6.5]
POST cohort						
No PCAP	672	23.5%	11.6%	674	16.6%	15.1%
PCAP	252	31.0%	12.7%	85	23.5%	20.0%
Difference [95% CI]						
Unadjusted		**7.7 [1.2; 14.3]**	1.1 [−3.7; 5.9]		6.9 [−2.5; 16.4]	4.9 [−4.1; 13.8]
Adjusted[2]		5.0 [−1.5; 11.6]	1.3 [−3.7; 6.2]		10.2 [−3.5; 24.0]	0.5 [−9.4; 10.5]

Notes.
[1]Adjusted for unit, respiratory diagnosis, and length of stay on unit using multiple logistic regression.
[2]Adjusted for unit, admission past 6 months using multiple logistic regression. Confidence intervals excluding zero shown in bold font.

Table 4. Transition experiences in interviewed sub-sample by study cohort (PRE/POST), *n* = 326

	PRE	POST	Multivariable
Transition experience	(*n* = 147)	(*n* = 179)	regression models*
			(Logistic regression)
Items:	%	%	**Risk difference, % [95% CI]**
1. Received verbal information related to discharge	66.7	72.6	6.5 [−3.8; 16.8]
2. Opportunity to ask questions about what to do once home	61.2	74.9	**13.7 [3.3; 24.0]**
3. Received written patient instructions	37.4	70.4	**35.6 [25.4; 45.8]**
4. Knows reason for admission	87.1	92.7	**6.9 [0.1; 14.0]**
5. Understands purpose of medications and how to take them	49.0	49.2	−2.2 [−12.8; 8.4]
6. Given information about symptoms to look for	22.5	37.4	**14.1 [4.5; 24.4]****
7. Given information about changes to make to daily routine or activities	33.3	42.5	10.1 [−0.9; 21.1]
8. Has complete information on follow-up appointments	68.0	91.6	**26.7 [17.7; 35.8]**
9. Received information on who to call with questions	19.7	26.8	6.6 [−2.5; 15.8]**
10. Received information on what to expect from CLSC	66.0	72.6	8.8 [−1.4; 19.0]
			(Linear regression)
Score:	Mean (SD)	Mean (SD)	Beta*[95% CI]
Transition experience (0-10):	5.1 (2.2)	6.3 (1.9)	**1.3 [0.8; 1.7]**

Interaction p-value between hospital and study cohort: p = 0.148.
*Multivariable models conducted for each item and score; the models include hospital, unit, age, sex, days from discharge to follow-up, ISAR score, Charlson Comorbidity Index, primary discharge diagnosis (endocrine, mental, circulatory, respiratory, genitourinary, injury);
**After model reduction (number of covariates range from 5 to 8).
Risk difference of POST cohort is computed from the logistic model (reference:PRE cohort)
Beta estimate of POST cohort is computed from the linear regression (reference:PRE cohort)
CLSC = local community services centre.
For logistic regression: Confidence intervals excluding 0 shown in bold font.
For linear regression: Confidence intervals excluding 0 shown in bold font.

(from which the PCAP was adapted) was conducted in selected hospitals that exhibited a high level of readiness for the intervention (Hahn-Goldberg et al., 2021). Additional support for implementation was also provided in the latter study using a "community of practice model," probably accounting for the higher level of penetration of the tool: 64 versus 20 per cent in our study. In contrast, the support provided in our study was limited to staff education and reminders to complete the PCAP before discharge.

Table 5. Transition experiences in POST interviewed sub-sample by completion of PCAP, *n* = 179

Patient experiences	No PCAP (*n* = 127)	PCAP (*n* = 52)	Multivariable regression models
			(Logistic regression)
Items:	**%**	**%**	**Risk difference, % [95% CI]**
1. Received verbal information related to discharge	70.9	76.9	13.0 [–2.7; 28.6]
2. Opportunity to ask questions about what to do once home	76.4	71.2	–2.4 [–19.1; 14.4]
3. Received written patient instructions	68.5	75.0	**21.1 [6.9; 35.4]**
4. Knows reason for admission	92.9	92.3	–0.2 [–11.9; 11.6]
5. Understands purpose of medications and how to take them	52.0	42.3	**20.4 [4.5; 36.3]****
6. Given information about symptoms to look for	38.6	34.6	3.4 [–10.5; 23.3]**
7. Given information about changes to make to daily routine or activities	41.7	44.2	1.6 [–18.9; 22.1]**
8. Has complete information on follow-up appointments	92.9	88.5	–5.5 [–18.1; 7.1]
9. Received information on who to call with questions	22.8	36.5	13.2 [–4.8; 31.1]**
10. Received information on what to expect from CLSC	69.3	80.8	1.7 [–16.0; 19.3]
			(Linear regression)
Total score:	**Mean (SD)**	**Mean (SD)**	**Beta*[95% CI]**
Transition experience (0-10)	6.3 (1.9)	6.4 (2.0)	0.7 [–0.0; 1.5]
Interaction p-value between hospital and study cohort p = 0.012.			
Stratified analyses:			
Hospital A (n = 88):	5.5 (1.9)	6.7 (1.9)	*0.9 [0.0; 1.8]***
Hospital B (n = 91):	6.8 (1.6)	5.9 (2.1)	*0.6 [–0.8; 2.1]***

*Multivariable models conducted for each item and total score; the models include hospital, unit, sex, education, prior home services use, ISAR score, primary discharge diagnosis (mental, circulatory, respiratory, digestive, genitourinary, injury).
**After model reduction (number of covariates range from 4 to 8).
Risk difference of PCAP cohort is computed from the logistic model (reference:NO PCAP group).
Beta estimate of PCAP cohort is computed from the linear regression (reference:NO PCAP group).
CLSC = local community services centre.
For logistic regression: Confidence intervals excluding 0 shown in bold font.
For linear regression: Confidence intervals excluding 0 shown in bold font.

Previous research on patient-centred discharge tools measured limited patient experiences with mostly negative results (Cancino et al., 2017; Hahn-Goldberg et al., 2021). We used a more extensive battery of 10 questions and one summary transition experience scale. After adjustment for covariates, patients/caregivers in the POST interview sample were more likely to report that they had been given information on 5 of the 10 experience items, with increases of 36.7 and 26.7 per cent, respectively, in written instructions, and complete information on follow-up appointments.

We found evidence of a selection bias in terms of which units and patients had higher rates of PCAP use. We hypothesize that nurses may have selected specific patients to receive a PCAP, although we are not aware of previous research on this topic. At Hospital A with an implementation rate of 27.3 per cent, patients more likely to receive a PCAP were those discharged from the geriatric (vs. a medical) unit, younger patients, men, and those with a previous hospital admission. At Hospital B with an implementation rate of 11.2 per cent, PCAP completion was almost entirely limited to the geriatric assessment unit. Geriatric units at our hospitals have more developed care protocols, resulting in greater staff awareness of the benefits of good transitional care than those in medical units. Staff may have used other criteria to select patients to receive a PCAP, perhaps choosing to use the PCAP tool for patients whom they thought might benefit from more structured discharge information. Interesting, however, qualitative results

from the Ontario PODS implementation project suggested that patients without prior hospital experience may have a greater need for the tool (Hahn-Goldberg et al., 2021) and may benefit more than those with such experience. Finally, Hospital A had a higher overall implementation, but more missing information than Hospital B, perhaps indicating a desire to complete the PCAP but with insufficient time to fill in all the information fields. This higher rate of implementation may be linked to the decline in return ED visits in Hospital A.

There are several possible reasons for the lower-than-expected rate of PCAP implementation. First, despite our emphasis on the project being a partnership-driven QI initiative, clinical staff continued to refer to it as a *research* project, perhaps considering research an objective secondary to effecting clinical care rapidly (Lamontagne, Rowan, & Guyatt, 2021). Second, there may have been insufficient attention to obtaining buy-in from and engaging frontline nursing staff, which can be labor-intensive. Dedicated staff resources during implementation may be needed to support implementation, which could include other team members (e.g., social work, occupational therapy, physiotherapy) to make the process more manageable. A designated team member could check on whether the PCAP has been started during an admission and on the completeness of information provided. Focus groups to identify barriers to implementation could be held. Third, although the PCAP was supposed to be completed progressively throughout

the patient's hospital stay, it may have been deferred until the last minute, leaving insufficient time for completion. Fourth, there was considerable institutional restructuring of clinical service lines going on at the time of implementation, which may have detracted from the focus on PCAP.

There are several limitations to the study. First, we were unable to control for the effect of time. Other changes in the organization of care independent of the PCAP may have been responsible for the improvement in patient transition experiences and the reduction in ED visits at one hospital. However, none of these other changes addressed patient/family discharge education. Second, the comparisons of outcomes between those with and without a PCAP are likely to be biased by unmeasured confounding, due to selection of patients thought by staff to be at a higher risk of readmission. This selection bias limits interpretation of comparisons in outcomes between those with and those without a PCAP. Third, some of the confidence intervals from the PCAP versus no-PCAP regressions at Hospital B were wide, because of the relatively small number of patients with a PCAP at Hospital B. However, we prefer to present the results separately by hospital, as there are some interesting differences between them. Fourth, some of the information given to patients/caregivers before discharge may have been forgotten one week later (Rowe, Yaffe, Pepler, & Dulka, 2000). The PCAP can serve as a reminder of key discharge information. Fifth, we were not able to complete the planned staff survey and interviews due to disruptions caused by the COVID-19 pandemic. These data would have helped with the interpretation of the results. However, three key partners (M-PB, SH, and BTJ) co-authored the paper, providing their insights into our conclusions. Sixth, the use of hospital-based administrative data limited our ability to capture readmissions and return ED visits to other hospitals. We had insufficient funds to obtain provincial administrative data.

Conclusions and Practice Implications

In this PRE and POST study, we found evidence of changes over time from before to after implementation of a patient-centred discharge tool, the PCAP: There was a decline in ED visits at one hospital and an increase in the transition experiences score at both hospitals. These are positive findings, despite the lower-than-expected rates of PCAP implementation. However, there remained substantial gaps in knowledge of patients/caregivers about key recommended information, even after PCAP implementation.

There are several implications for practice. First, enhancement of discharge educational interventions could include "talk-back" methods to ensure that patients/caregivers understand the instructions and information provided by clinical staff during the hospital stay and at discharge (Oh, Lee, Yang, & Kim, 2021; Yen & Leasure, 2019). Second, use of computerized tools with pre-populated fields (e.g., family doctor, reason for admission) could be printed out as part of admission paperwork. Drop-down menus could improve the efficiency, completeness, and legibility of information provided while the patients are on the unit. Notably, information such as a telephone number to call, home care services planned, and changes to routine was frequently omitted. Third, use of the transition experience scale developed in this study could be used to target areas for improvement in patient/family education. Fourth, if enhanced patient education using the PCAP cannot be implemented in all discharges, use of a high-risk screening tool to detect those patients at increased risk of readmission may help target the

intervention to those at greatest risk of readmission (McCusker et al., 2022). Fifth, further sensitization of staff is warranted about discharge planning being part of the hospitalization process and the need to review the PCAP during the hospitalization. Sixth, dedicated resources are needed to support future implementation. Finally, implementation may be improved through use of a "communities of practice" approach (Hahn-Goldberg et al., 2021).

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