BMJ Open Quality

Person-centred quality indicators are associated with unplanned care use following hospital discharge

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To cite: Kemp K, Steele B, Ahmed S, *et al*. Person-centred quality indicators are associated with unplanned care use following hospital discharge. *BMJ Open Quality* 2024;**13**:e002501. doi:10.1136/bmjoq-2023-002501

Received 13 July 2023
Accepted 15 December 2023

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ABSTRACT

Objective Performance indicators are used to evaluate the quality of healthcare services. The majority of these, however, are derived solely from administrative data and rarely incorporate feedback from patients who receive services. Recently, our research team developed person-centred quality indicators (PC-QIs), which were co-created with patients. It is unknown whether these PC-QIs are associated with unplanned healthcare use following discharge from hospital.

Design A retrospective, cross-sectional study.

Methods Survey responses were obtained from April 2014 to September 2020 using the Canadian Patient Experiences Survey - Inpatient Care instrument. Logistic regression models were used to predict the link between eight PC-QIs and two outcomes; unplanned readmissions within 30 days and emergency department visits within 7 days.

Results A total of 114 129 surveys were included for analysis. 6.0% of respondents (n=6854) were readmitted within 30 days, and 9.9% (n=11 287) visited an emergency department within 7 days of their index discharge. In adjusted models, 'top box' responses for communication between patients and physicians (adjusted OR (aOR)=0.82, 95% CI: 0.77 to 0.88), receiving information about taking medication (aOR=0.86, 95% CI: 0.80 to 0.92) and transition planning at hospital discharge (aOR=0.79, 95% CI: 0.73 to 0.85) were associated with lower odds of emergency department visit.
Likewise, 'top box' responses for overall experience (aOR=0.87, 95% CI: 0.82 to 0.93), communication between patients and physicians (aOR=0.73, 95% CI: 0.67 to 0.80) and receiving information about taking medication (aOR=0.90, 95% CI: 0.83 to 0.98), were associated with lower odds of readmission.

Conclusions This study demonstrates that patient reports of their in-hospital experiences may have value in predicting future healthcare use. In developing the PC-QIs, patients indicated which elements of their hospital care matter most to them, and our results show agreement between subjective and objective measures of care quality. Future research may explore how current readmission prediction models may be augmented by person-reported experiences.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Patient-centredness is one of the Institute of Medicine's six key domains of healthcare quality. By proving their feedback, via surveys or other means, patients can provide valuable information to improve the quality of healthcare services. Person-centred quality indicators (PC-QIs) have been developed for this purpose.

WHAT THIS STUDY ADDS

⇒ Certain PC-QIs, particularly those which focus on communication between patients and providers, medication information and discharge planning are associated with subsequent unplanned acute care use following discharge. Even when controlling for a variety of clinical and demographic characteristics, poorer scores on these PC-QIs were associated with increased odds of an emergency department visit within 7 days, as well as an unplanned readmission within 30 days of discharge.

HOW THIS STUDY MAY AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Our findings suggest that efforts to increase in-hospital communication between patients and providers, and to improve education around medications and discharge processes may reduce unplanned acute care use after discharge. This may provide benefits to the patient and the healthcare system, alike.

INTRODUCTION

There are a multitude of accepted measures to evaluate the quality of healthcare services. As per the Donabedian model, these may be categorised into three main groups; structural (eg, number of hospital units using an electronic medical record system), process (eg, per cent of persons with diabetes who received A1C screening) and outcome (eg, per cent of patients with a hospital-acquired infection).[1] Many of these measures of quality, however, have been developed in the absence of patients, and thus, may fail to incorporate the viewpoints of the primary recipients of healthcare services. In 2001, the Institute of Medicine presented one of the most widely used frameworks to assess the quality of healthcare services. The framework's six key domains were that healthcare services should be safe, effective, timely, efficient, equitable and patient centred, with patient-centred

defined as 'providing care that is respectful of, and responsive to individual patient preferences, needs and values and ensuring that patient values guide all clinical decisions'.[2]

There is now wide recognition that patients can play a key role in evaluating the quality of healthcare services. Patient feedback about their satisfaction and experiences with healthcare services are captured in many settings, using surveys which ask the patient to evaluate multiple aspects of their care. For example, the Consumer Assessment of Healthcare Providers and Systems compliment of surveys are used to evaluate care received in settings which include hospitals, emergency departments and outpatient clinics.[3] Although these surveys were developed in extensive consultations with patients, they can be quite lengthy and the items within may be of varying importance to patients.

Recently, our research team developed a comprehensive set of person-centred quality indicators (PC-QIs) using a multiphased approach with health system experts, patients and family members.[4] Recognising the need to include items which matter most to patients in the evaluation of healthcare quality, the outcome of this work was a core group of 26 PC-QIs (7 structure, 16 process, 2 outcome and 1 global PC-QI) which aligned with the Donabedian model.[4] The PC-QIs can be derived from validated surveys, in this work we used the Canadian Patient Experiences Survey - Inpatient Care (CPES-IC), table 1 includes the PC-QIs and corresponding domains in the CPES-IC.

To date, these PC-QIs have not been evaluated alongside other potential measures of healthcare quality. Therefore, our study aim was to examine the association between the PC-QIs with unplanned healthcare use, specifically emergency department visits and unplanned readmissions following discharge from hospital.

METHODS

Data sources and study design

The study employed a retrospective, cross-sectional design, linking patient survey data with emergency department and inpatient hospital records.

Survey data were obtained using a modified version of the CPES-IC—encompassing hospital discharges from April 2014 to September 2020. The CPES-IC is a validated tool, which was developed by Canadian Institute for Health Information (CIHI), in partnership with pan-Canadian stakeholders.[5] The CPES-IC is based on the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey, with additional questions developed for the Canadian context. In Alberta, the survey is completed by telephone with adult patients from 2 to 42 days after hospital discharge. The CPES-IC is provincial in scope and is administered for discharges at 93 hospitals in the province using a standard script and responses to frequently asked questions. A random sample of 10% of eligible discharges is obtained from each hospital, with approximately 25 000 surveys completed annually. The survey contains 56 questions which ask respondents to assess many aspects of their care including communication with doctors and nurses, medications, patient/family involvement in care, pain control, the physical hospital environment, coordination of care and discharge planning. Responses to each process-related question are Likert ones (eg, always, usually, sometimes, never), while overall rating questions are on a scale from 0 (worst) to 10 (best).

For the purposes of this study, the research team assigned questions from the CPES-IC survey to the PC-QIs created by Santana *et al*[4] table 1 presents this alignment between the PC-QI framework and associated questions on the CPES-IC. A total of 21 survey questions were mapped onto eight of the existing PC-QIs.

Completed surveys were linked with corresponding inpatient records, from the Discharge Abstract Database (DAD).[6] In Alberta, the DAD captures all discharges from hospitals in the province and is coded according to standards established by CIHI. Surveys were also linked with emergency department records, as available from the National Ambulatory Care Reporting System data set.[7] Surveys were linked to inpatient and emergency department records using the personal health number and visit dates (eg, admission, discharge).

Variables

The primary outcomes of the study were emergency department visit within 7 days, and unplanned readmission within 30 days of hospital discharge. Each was constructed as a binary outcome (yes/no) for each index hospital discharge. A variety of demographic and clinical variables were included as covariates in our analyses. These included age at time of hospital discharge (less than 55 years, 55–69, 70 years and older), sex, level of education (less than high-school, some high school, high school or equivalent, college certificate/diploma, university, advanced or professional degrees), self-rated mental and physical health (each reported as excellent, very good, good, fair, poor), length of hospital stay (less than 3 days, 3–7, greater than 7 days), admission category (urgent, elective), number of Elixhauser comorbidities[8 9] and the month and year of hospital discharge.

Statistical analyses

Survey responses to each question were calculated as percent in 'top box', where 'top box' corresponded to the most positive answer choice.[10] In cases where multiple survey questions aligned with a given PC-QI, the aggregate score for the survey questions was calculated in similar fashion to calculation of HCAHPS domain scores.[11]

Descriptive statistics were generated for each of the CPES-IC questions examined, as well as age, sex, education and length of hospital stay. Logistic, mixed effect (multilevel) regression models were used to test the association between the PC-QIs and each of the two outcomes (emergency department visit within 7 days, unplanned

Table 1 CPES-IC questions aligned with person-centred quality indicators (PC-QIs)

PC-QI theme	PC-QI	Related CPES-IC question
Overall quality of experience	O1. Overall experience	O1. Using any number from 0 to 10, where 0 is the worst hospital possible and 10 is the best hospital possible, what number would you use to rate this hospital during your stay?
	O2. Cost of care – affordability	n/a
	G1. Global indicator – friends and family test	G1. Would you recommend this hospital to your friends and family?
Structural indicators of PCC	S1. Policy on person-centred care	n/a
	S2. Educational programmes on person-centred care	n/a
	S3. Culturally competent care	n/a
	S4. Providing an accommodating and supportive person-centred care environment	n/a
	S5. Co-designing care in partnership with communities	n/a
	S6. Health information technology to support person-centred care	n/a
	S7. Structures to report person-centred care performance	n/a
Equitable access and treatment	P1. Compassionate care	n/a
	P2. Equitable treatment	n/a
	P3. Trusting relationship with healthcare provider	n/a
	P4. Assessing interpreter services	n/a
Communication with healthcare professionals	P5. Communication with healthcare system	n/a
	P6. Communication between patient and healthcare provider – nurse	P6. During this hospital stay, how often did nurses treat you with courtesy and respect? P6. During this hospital stay, how often did nurses listen carefully to you? P6. During this hospital stay, how often did nurses explain things in a way you could understand?
	P7. Communication between patient and healthcare provider – physician	P7. During this hospital stay, how often did doctors treat you with courtesy and respect? P7. During this hospital stay, how often did doctors listen carefully to you? P7. During this hospital stay, how often did doctors explain things in a way you could understand?
Education, engagement, coordination and access	P8. Information about taking medication	P8. During this hospital stay, did you get all the information you needed about your condition and treatment? P8. Before you left the hospital, did you have a clear understanding about all of your prescribed medications, including those you were taking before your hospital stay?'
	P9. Communicating test results	P9. How often were tests and procedures done when you were told they would be done?
	P10. Coordination of care	P10. Did you feel that there was good communication about your care between doctors, nurses and other hospital staff? P10. How often did doctors, nurses and other hospital staff seem informed and up-to-date about your hospital care? P10. Was your transfer from the emergency department into a hospital bed organised? P10. Was your admission into the hospital organised?

Continued

Table 1 Continued

PC-QI theme	PC-QI	Related CPES-IC question
	P11. Patient involvement in decisions about their care and treatment	P11. Were you involved as much as you wanted to be in decisions about your care and treatment during this hospital stay? P11. Were your family or friends involved as much as you wanted in decisions about your care and treatment?
	P12. Engaging patients in managing their own health	n/a
	P13. Timely access to a primary care provider	n/a
	P14. Patient preparation for a planned treatment programme	n/a
	P15. Transition planning	P15. Did you receive enough information from hospital staff about what to do if you were worried about your condition or treatment after you left the hospital? P15. During this hospital stay, did doctors, nurses or other hospital staff talk with you about whether you would have the help you needed when you left the hospital? P15. When you left the hospital, did you have a better understanding of your condition than when you entered? P15. During this hospital stay, did you get information in writing about what symptoms or health problems to look out for after you left the hospital?
	P16. Using patient-reported outcome measures to deliver patient-centred care	n/a

CPES-IC, Canadian Patient Experiences Survey - Inpatient Care ; PCC, Person-centred care.

readmission within 30 days). In all regression analyses, the group of respondents who did not report a 'top box' response comprised the reference group. Hospitals with less than 100 total observations across the study period were excluded from analyses. Data linkage and descriptive analyses were performed using SAS V.9.4. Additional data cleaning was performed using R V.4.2.2, while the regression analyses were done using the 'melogit' command in Stata MP.

RESULTS

Over the study period (April 2014 to September 2020), a total of 155 094 completed surveys were collected. After applying the inclusion criteria and removing case-incomplete records (those with missing covariates or outcomes), 114 129 cases remained (73.6% of original sample) to form the analytical sample. Among this sample, a total of 11 287 (9.9%) of patients visited the emergency department within 7 days of discharge, while 6854 (6.0%) of patients were readmitted within 30 days of discharge. Descriptive statistics are presented in table 2, according to both outcomes.

Table 3 presents the associations between 'top box' responses to the PC-QIs and odds of readmission and emergency department visit. Both crude and adjusted odds are provided, with those not reporting 'top box' response as the reference group. In the crude models, 'top box' responses were associated with decreased odds of readmission within 30 days of discharge for every PC-QI studied. In the adjusted models, 'top box' responses for overall experience (adjusted OR (aOR)=0.87, 95% CI: 0.82 to 0.93), communication between patients and physicians (aOR=0.73, 95% CI: 0.67 to 0.80) and receiving information about taking medication (aOR=0.90, 95% CI: 0.83 to 0.98), were associated with decreased odds of readmission within 30 days of discharge. Like with readmissions, in the crude models, 'top-box' responses were associated with decreased odds of visiting the emergency department within 7 days of discharge for every PC-QI studied. In the adjusted models, 'top box' responses for communication between patients and physicians (aOR=0.82, 95% CI: 0.77 to 0.88), receiving information about taking medication (aOR=0.86, 95% CI: 0.80 to 0.92) and transition planning at hospital discharge (aOR=0.79, 95% CI: 0.73 to 0.85) were associated with lower odds of visiting the emergency department within 7 days of discharge.

DISCUSSION

Main findings

In this paper, patients indicated which elements of their hospital care matter most to them and our results show agreement between subjective and objective measures of care quality. Higher PC-QI scores were associated with lower odds of a future visit to an emergency department

Table 2 Summary of clinical, demographic and Canadian Patient Experiences Survey - Inpatient Care variables by readmission (within 30 days of discharge) and emergency department visits (within 7 days of discharge)

	Readmitted	Not readmitted	Visited ED	Did not visit ED
	n=6854	n=107 275	n=11 287	n=102 842
Age (in years)		n (%)		
Under 55	2300 (33.6%)	50 190 (46.8%)	5178 (45.9%)	47 312 (46.0%)
55–60	2305 (33.6%)	30 772 (28.7%)	3398 (30.1%)	29 679 (28.9%)
Over 70	2249 (32.8%)	26 313 (24.5%)	2711 (24.0%)	25 851 (25.1%)
Gender				
Female	3702 (54.0%)	67 639 (63.1%)	6677 (59.2%)	64 664 (62.9%)
Male	3152 (46.0%)	39 636 (36.9%)	4610 (40.8%)	38 178 (37.1%)
Education				
Less than high school	382 (5.6%)	3936 (3.7%)	545 (4.8%)	3773 (3.7%)
Some high school	1274 (18.6%)	14 918 (13.9%)	1828 (16.2%)	14 364 (14.0%)
High school or equivalent	1659 (24.2%)	25 679 (23.9%)	2773 (24.6%)	24 565 (23.9%)
College certificate/diploma	1955 (28.5%)	32 164 (30.0%)	3378 (29.9%)	30 741 (29.9%)
University	903 (13.2%)	18 018 (16.8%)	1637 (14.5%)	17 284 (16.8%)
Postgraduate degree	681 (9.9%)	12 560 (11.7%)	1126 (10.0%)	12 115 (11.8%)
Length of stay (in days)				
Less than 3	2182 (31.8%)	56 276 (52.5%)	5180 (45.9%)	53 278 (51.8%)
3–7	2476 (36.1%)	31 385 (29.3%)	3773 (33.4%)	30 088 (29.3%)
More than 7	2196 (32.0%)	19 614 (18.3%)	2334 (20.7%)	19 476 (18.9%)

ED, Emergency department.

Table 3 Association between 'top box' responses to PC-QIs and odds of readmission and emergency department visit

	Readmission within 30 days of discharge		Emergency department visit within 7 days of discharge	
	OR (95% CI)*	aOR (95% CI)†	OR (95% CI)*	aOR (95% CI)†
O1. Overall experience	**0.77 (0.74 to 0.82)**	**0.87 (0.82 to 0.93)**	**0.85 (0.81 to 0.88)**	0.99 (0.94 to 1.04)
G1. Global indicator—friends and family test	**0.81 (0.77 to 0.85)**	0.95 (0.89 to 1.02)	**0.83 (0.80 to 0.87)**	0.95 (0.90 to 1.01)
P6. Communication between patient and nurse	**0.77 (0.72 to 0.83)**	1.05 (0.96 to 1.16)	**0.77 (0.72 to 0.81)**	0.98 (0.91 to 1.06)
P7. Communication between patient and physician	**0.66 (0.61 to 0.70)**	**0.73 (0.67 to 0.80)**	**0.70 (0.66 to 0.74)**	**0.82 (0.77 to 0.88)**
P8. Information about taking medication	**0.75 (0.70 to 0.79)**	**0.90 (0.83 to 0.98)**	**0.71 (0.68 to 0.75)**	**0.86 (0.80 to 0.92)**
P10. Coordination of care	**0.75 (0.70 to 0.80)**	0.99 (0.90 to 1.08)	**0.78 (0.74 to 0.83)**	1.05 (0.98 to 1.13)
P11. Patient involvement in decisions about care and treatment	**0.81 (0.76 to 0.86)**	0.99 (0.92 to 1.07)	**0.82 (0.78 to 0.86)**	1.01 (0.95 to 1.07)
P15. Transition planning	**0.77 (0.72 to 0.84)**	1.05 (0.95 to 1.16)	**0.65 (0.61 to 0.69)**	**0.79 (0.73 to 0.85)**

All statistically signifcant results (p<0.05) are bolded.
*ORs and 95% CIs are minimally adjusted for patient and hospital covariates.
†Adjusted ORs are adjusted for patient and hospital covariates and the seven other PC-QI variables.
PC-QIs, person-centred quality indicators .

as well as an unplanned hospital readmission. In isolation, all eight PC-QIs examined as part of this study were associated with lower odds for both outcomes. When adjusting for a variety of clinical and demographic factors which have been previously associated with variation in patient experience scores and for accounting for the effects of the full set of indicators, three of the PC-QIs showed lower odds of hospital readmission (overall experience, communication between patients and physicians, receiving information about taking medication), as well as emergency department visit (communication between patients and physicians, receiving information about taking medication, transition planning at hospital discharge).

Our study results are encouraging, and they support the findings of previous studies conducted by our own research team as well as others. In our prior works, we have observed that elements of patient experience from the CPES-IC survey are associated with patient safety indicators[12] as well as unplanned hospital readmission.[13–15] In similar fashion, Doyle *et al* conducted one of the largest systematic reviews to examine the potential links between person-reported experiences and other objective measures of healthcare quality.[16] In this work, which included a total of 55 studies across various clinical settings, patient groups and disease areas, the authors consistently noted a positive association between subjective ratings of patient experience and objectively-measured health outcomes.[16] These outcomes included medication adherence, screening and immunisation uptake and like with our study, measures of healthcare utilisation (eg, hospitalisation, length of stay, primary care visits).[16] Although the authors, like us, stress that these associations do not always imply causation, they go on to state that the 'weight of evidence across different areas of healthcare indicates that patient experience is clinically important'.[16] Doyle *et al* also advocated that the three dimensions of quality (as presented in the 'Triple Aim'; experience of care, population health, per capita cost)[17] should be looked at as a group and not in isolation; a statement that we also strongly endorse from the standpoint of the current study, as well as from our previous work.[16]

Gilmore *et al* in a recent narrative review summarised the use of patient surveys from 28 full-texts, highlighting that the majority of documented uses of patient experience surveys were at the micro-level (eg, focus on improving front-line clinical care). Interestingly, few macro-level uses were documented.[18] Recently, the 26 PC-QIs used in our study were the subject of an implementation plan within primary care. In this work, which involved 11 primary care providers, patients and quality improvement staff, 5 PC-QIs were prioritised along with 5 corresponding implementation strategies.[19] This model of collaboration may be used in other healthcare areas to ensure successful implementation of PC-QIs, leading to improvements which matter to patients, providers and health system partners. Figure 1 provides a visual of a process for using PC-QIs to improve person-centred care.

Strengths and limitations

This study has many notable strengths. The CPES-IC is a validated survey for capturing patient experiences. In addition to the survey itself, Alberta Health Services (AHS) uses a standard script, prompts and answers to frequently asked questions. Interviewers receive training and feedback to ensure that the survey is conducted in a consistent fashion. As the sole provider of hospital care for Alberta's 4.4 million residents, AHS has a provincial data warehouse which maintains all data sets which were used in the study. This data infrastructure allows for comprehensive, province-wide data linkages which are not possible in other jurisdictions, where care is delivered by multiple providers. The ability to link each survey with its respective inpatient hospital record allowed us to control for many variables at the individual level. The PC-QIs development followed a rigorous process with engagement of stakeholders, community partners and patients.[4] This work informs further validation of the PC-QIs.

With respect to limitations, in our sample we observed a 30-day readmission rate of 6.0%. When compared with the overall 30-day readmission rate seen over the past 5 years in our province (9.2–9.5%),[20] this suggests that our sample may be in better overall health, when compared with the larger inpatient population. A previous publication by our team has highlighted this, using data from 2011 to 2014.[21] Second, although readmissions are portrayed in a negative light in the present work, we acknowledge that not all readmissions may be preventable.[22 23] Although we controlled for a variety of clinical and demographic variables, we did not have access to data pertaining to family doctor visits, calls to 811 Health Link (a free health information service available in our province),[24] and the nature/primary reason for readmission. Future work could incorporate these aspects. As with any survey, recall bias may be present, as respondents with unplanned health services utilisation may have differentially recalled the experiences of their previous hospitalisation than those who did not. With respect to the survey sampling protocol, the CPES-IC survey is administered across our province in English only, does not sample patients who were hospitalised due to a mental health concern and does not allow for proxy respondents. Given that our findings may not be generalisable to these groups, future research is needed. Our team had completed work using text mining approaches to use patient narratives as a means to address this gap.[25] Other limitations that may impact the generalisability of our findings is that some patients may have chosen to not complete the survey due to its length (56 questions), and that Alberta's population is quite an affluent one with high levels of literacy.[26]

CONCLUSIONS

Our study demonstrates that patient reported experience data/PC-QIs may be able to predict future unplanned healthcare use. The study findings could be used by

healthcare systems to inform policies to improve overall experience with care received by hospitalised patients, enhance communication between patients and physicians, bolster information sharing with patients related to their medication regimen and to better support patients in their transition from hospital to home/community living. Addressing these areas could result in tangible reductions in subsequent emergency department and inpatient use; benefitting both patients and healthcare systems. Opportunities to report our results back to stakeholders, including patients, would be greatly appreciated by our research team and may also serve as an educational tool/prompt for patients who find themselves hospitalised in future.

Contributors All authors have contributed to the conceptualisation of this study. They have reviewed the manuscript and have approved its submission. KK is responsible for the overall content as guarantor. As such, KK accepts full responsibility for the finished work and/or the conduct of the study, had access to the data, and controlled the decision to publish.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants and was approved by University of Calgary Conjoint Health Research Ethics Board (CHREB) - file number REB15-1838. Given the retrospective nature of this secondary data analysis, it was impractical to obtain consent from patients. As such, our research ethics board granted a waiver of consent.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data may be obtained from a third party and are not publicly available.

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