



## Clinical Research

# Patient-Reported Experiences With Coronary Artery Bypass Grafting and Valve Replacement

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*See editorial by Graham and Norris, pages 1265–1266 of this issue.*

### ABSTRACT

**Background:** The Canadian Patient Experience Survey—Inpatient Care is a validated measure for adult inpatient experience. Linking surveys with administrative data can examine the experience of patients in specific demographic or clinical groups.

**Methods:** We examined survey responses obtained over a 4-year period from patients who underwent coronary artery bypass graft and/or valve replacement in Alberta. The 56-question telephone survey was administered within 6 weeks of discharge. Surveys were linked with administrative records to identify the Canadian Classification of Intervention procedure codes, which were in scope. Responses to each question were reported as percentage in “top box,” where “top box” represents the most positive answer choice (eg, “always” and “yes”).

**Results:** From April 2014 to March 2018, 1082 surveys were completed by patients who underwent coronary artery bypass graft and/or valve replacement. Respondents were predominantly male (73.8%), with a mean age of 64.7 ± 11.9 years. Overall, 73.3% of respondents rated their hospital care as 9 or 10 out of 10 (best), and 86.2% would “definitely recommend” the hospital to friends/family

### RÉSUMÉ

**Introduction :** Le Sondage sur les expériences d’hospitalisation des patients canadiens est un outil valide de mesure de l’expérience des patients adultes hospitalisés. Le couplage des sondages aux données administratives peut permettre d’examiner l’expérience des patients de groupes démographiques ou cliniques particuliers.

**Méthodes :** Nous avons examiné les réponses obtenues au sondage sur une période de 4 ans auprès de patients qui avaient subi un pontage aortocoronarien ou un remplacement valvulaire, ou les deux, en Alberta. Nous avons fait passer un sondage téléphonique de 56 questions dans les 6 semaines après la sortie de l’hôpital. Les sondages ont été couplés aux dossiers administratifs pour trouver les codes d’interventions de la Classification canadienne des interventions en santé, qui en faisaient partie. Les réponses à chacune des questions étaient exprimées en pourcentage dans la « catégorie supérieure », c’est-à-dire que la « catégorie supérieure » représente le choix le plus positif de réponse (par exemple « toujours » et « oui »).

**Résultats :** D’avril 2014 à mars 2018, les patients qui avaient subi un pontage aortocoronarien ou un remplacement valvulaire, ou les deux, ont rempli 1082 sondages. Les répondants étaient surtout des

In 2001, the Institute of Medicine report entitled “Crossing the quality chasm: a new health system for the 21st century” outlined how the health care delivery system could be designed to

innovate and improve care.<sup>1</sup> Six key aims were presented, that care should be safe, effective, timely, efficient, equitable, and patient-centred. Although there are many working definitions of patient-centred care (PCC), the most commonly used one was also presented. The Institute of Medicine stated that PCC is “providing care that is respectful of and responsive to individual patient preferences, needs, and values, and ensuring that patient values guide all clinical decisions.”<sup>1</sup> Although this particular definition of PCC places the patient at the forefront, it is widely acknowledged that the term “PCC” may be expanded upon to include family members and informal caregivers.<sup>2</sup> In addition, many jurisdictions and health care organizations have adopted

Received for publication February 24, 2019. Accepted May 7, 2019.

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See page 1351 for disclosure information.

members. Top performing questions pertained to having a discussion about help needed after discharge (96.6% responding “yes”) and receiving written discharge information (93.2% responding “yes”). Lack of quietness of the hospital environment at night (34.8% responding “always”) and lack of staff sufficiently describing side effects of new medications (44.9% responding “always”) were identified as potential areas for improvement.

**Conclusions:** Our results provide patient-reported experiences about inpatient cardiac care in Alberta hospitals. The findings could inform quality improvement initiatives that are patient-centred.

the term “person-centred care” as it places the person first by not reducing a person to the sum of their symptoms or given condition.<sup>3</sup>

In medicine, PCC is often measured via surveys, specifically ones that measure patient experience.<sup>4-6</sup> Improving the patient experience is also one of the 3 aims of the Institute for Healthcare Improvement’s Triple Aim Framework.<sup>7</sup> The idea of using patient feedback to improve care is not new. One of the earliest documented examples may be attributed to Ernest Codman at Boston General Hospital in 1910.<sup>8</sup> In the Canadian context, a 1994 article in the *Journal of the Canadian Medical Association* reported survey results from 4599 patients discharged from 57 hospitals in 6 provinces.<sup>9</sup> Today, many Canadian organizations include patient surveys as part of their protocols/policies. Examples of these include the Canadian Institute for Health Information (CIHI),<sup>10</sup> Alberta Health Services (AHS),<sup>11</sup> the Health Quality Council of Alberta,<sup>12</sup> Health Quality Ontario,<sup>13</sup> and the British Columbia Ministry of Health.<sup>14</sup>

Despite the proliferation of patient experience surveys and the potential for their use for clinical quality improvement activities, Canadian research in this area is scant. This is especially so when it comes to examining the experience of patients from specific demographic backgrounds, those living with specific clinical conditions, or those who have undergone specific treatments. Examining the comprehensive experience of patients who have undergone cardiac procedures such as coronary artery bypass grafting (CABG) and valve replacement may provide tremendous value. Given the labour-intensive and costly nature<sup>15</sup> of these procedures, as well as the additional impacts to patients and their families (eg, prolonged hospital stay, lifestyle modification, associated recovery, and morbidity),<sup>16</sup> it is critical to ensure that each cardiac procedure is a success. This is especially so within the context of the Canadian health care system—one with limited, publicly funded resources.

Over the past decades, a great deal of quality improvement work has taken place to improve patient outcomes after cardiac surgery. Like in many medical specialties, however, the great majority of this work has tended to focus on clinical

hommes (73,8 %), dont l’âge moyen était de  $64,7 \pm 11,9$  ans. Dans l’ensemble, 73,3 % des répondants ont accordé à leurs soins hospitaliers une cote de 9 ou de 10 sur 10 (la plus élevée), et 86,2 % « recommanderaient certainement » l’hôpital à leurs amis et aux membres de leur famille. Les questions qui ont eu la meilleure cote concernaient le fait d’avoir une discussion sur l’aide nécessaire après la sortie de l’hôpital (96,6 % ont répondu « oui ») et de recevoir des renseignements écrits à la sortie de l’hôpital (93,2 % ont répondu « oui »). Le manque de tranquillité de l’environnement hospitalier durant la nuit (34,8 % ont répondu « toujours ») et le manque de personnel pour décrire adéquatement les effets secondaires des nouveaux médicaments (44,9 % ont répondu « toujours ») ont été considérés comme les points à améliorer.

**Conclusions :** Nos résultats fournissent les expériences rapportées par les patients sur les soins en cardiologie aux patients hospitalisés dans les hôpitaux de l’Alberta. Les résultats pourraient influencer les initiatives sur l’amélioration de la qualité de manière à ce qu’elles soient axées sur le patient.

outcomes (eg, reducing mortality, increasing medication compliance, and decreasing unplanned readmissions), without the inclusion of the “patient voice.” We propose that patient experience surveys, when linked with administrative data to specifically target specific clinical populations, can provide patient-reported information to make further improvements. As such, the goal of the present study was to examine the comprehensive experience of patients who have undergone CABG and/or valve replacement in hospitals in Alberta, Canada. To our knowledge, this study is the first of its kind in Canada, one which uses a validated survey and linkage with administrative records to do so.

## Methods

### Data sources

Survey data for this study were obtained using a modified version of the Canadian Patient Experiences Survey—Inpatient Care (CPES-IC),<sup>17</sup> encompassing hospital discharges from April 2014 to March 2018. The CPES-IC is a validated tool, which was developed by CIHI, in partnership with pan-Canadian stakeholders.<sup>17</sup> The survey is based on the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS), which is widely used in the United States under the mandate of the Patient Protection and Affordable Care Act of 2010.<sup>18</sup> As of December 2018, the CPES-IC was administered across 7 Canadian provinces: British Columbia, Alberta, Manitoba, Ontario, New Brunswick, Nova Scotia, and Prince Edward Island.<sup>17,19</sup> In Alberta, a modified version of the CPES-IC is administered via telephone by AHS. Adult patients (18 years and older) are surveyed within 2 to 42 days after their discharge from hospital. The complete list of exclusion criteria for the survey is provided elsewhere.<sup>20</sup> Surveys are administered across 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, resulting in approximately 25,000 completed surveys each year. The survey comprises 56 questions, requiring approximately 12 to 18

minutes to complete. Questions assess many aspects of care, including communication with doctors, communication with nurses, medications, patient/family involvement in care, pain control, the physical hospital environment, coordination of care, and discharge planning. Responses to each question are based on Likert-type scales (eg, always, usually, sometimes, and never), and in the case of questions that ask the respondent to provide an overall rating, this is done on a scale from 0 (worst) to 10 (best). For the purposes of this study, and to facilitate future inter-jurisdictional comparisons, only the items on the standard CPES-IC survey were included for analysis. Items pertaining to hospital arrival and care received via the emergency department were also excluded. The complete list of survey questions that were examined, as well as their corresponding response options is provided in [Table 1](#).

To obtain relevant clinical data, completed surveys were linked with corresponding inpatient records from the Discharge Abstract Database (DAD).<sup>21</sup> In Alberta, the DAD captures all discharges from hospitals in the province and is coded according to standards established by CIHI. By reviewing patient charts, health information professionals assign up to 25 diagnosis and 20 procedure codes to each inpatient record. Surveys were linked to inpatient records using the patient's personal health number, the hospital code (5-digit identifier), and the date of hospital discharge. To determine cardiac procedures that were in scope for this study, we selected patients based on the presence of appropriate Canadian Classification of Intervention (CCI) procedure codes in each record.<sup>22</sup> Patients with at least 1 CCI code for CABG (1.IJ.76<sup>~</sup>) and/or valve replacement (1.HS.90<sup>~</sup>, 1.HT.90<sup>~</sup>, 1.HU.90<sup>~</sup>, 1.HV.90<sup>~</sup>) in any of the 20 procedure code fields were included. All eligible cases for the present study were treated at the 2 main cardiac surgery centres in Alberta: the Libin Cardiovascular Institute (Foothills Medical Centre, Calgary), and the Mazankowski Heart Institute (University of Alberta Hospital, Edmonton).

### Statistical analysis

Descriptive statistics were used to categorize the demographic and clinical characteristics of survey respondents. Demographic variables included sex, age group (18-59, 60-69, and 70 years and older), education level (less than high school, high school or college, and university), self-reported physical health, and self-reported mental health (both reported as excellent, very good, good, fair, or poor). Clinical variables included admission type (urgent or elective), length of stay (< 3, 3-7, and > 7 days), number of comorbid conditions (none, 1, and 2 or more), and discharge disposition (discharged home with/without support services vs other). The number of comorbid conditions was calculated using the Elixhauser Comorbidity Index<sup>23</sup> according to a validated algorithm.<sup>24</sup> This list of demographic and clinical variables was selected as these have been previously shown to be associated with a patient's overall rating of care on the survey.<sup>20</sup>

Responses to each survey question were classified according to the HCAHPS "top box" methodology.<sup>25</sup> "Top box" survey responses represent the most positive response option to each question. For the "overall rating" questions, these are responses of 9 or 10, on the scale from 0 (worst) to 10 (best).

For the "recommendation of hospital to family/friends" question, the "top box" response was "definitely yes." For the majority of the remaining questions, the "top box" response is "always" (eg, nurses "always" treating the patient with courtesy and respect). The percentage of respondents with a "top box" response was reported for each survey question.

Differences in percent of "top box" survey responses between clinical groups were assessed using  $\chi^2$  tests. Statistical significance was determined a priori as any *P*-value less than 0.05. Lastly, a multivariate logistic regression model was used to explore the potential relationship between odds of reporting a "top box" response for overall experience and the demographic/clinical variables listed above. All analyses were performed using SAS statistical software version 9.4 for Windows (SAS Institute Inc, Cary, NC) and IBM SPSS statistical software version 25 (IBM Inc, Armonk, NY). This study was approved by the University of Calgary Conjoint Health Research Ethics Board (project number: REB15-1838). Because of the retrospective nature of the data, a waiver of consent was granted by the ethics board. All study data were obtained via a research agreement between the research team and AHS (agreement number: 15539). This study was conducted at the University of Calgary (Calgary, Alberta, Canada).

### Results

Over the 4-year study period, a total of 1082 respondents who completed the CPES-IC in Alberta had undergone at least one of the included cardiac procedures. From this, 527 respondents (48.7%) underwent CABG only, 416 (38.5%) had an isolated valve replacement, and the remaining 139 respondents (12.9%) underwent a combination of CABG and valve replacement. The demographic and clinical profile of respondents are shown, both overall and stratified by procedure type(s), in [Table 2](#). Overall, respondents were primarily male (73.8%), 60 years of age or older (71.8%), and had an education level of high school diploma or greater (81.0%). Respondents had a more positive rating of their mental health than their physical health (69.6% vs 44.2% responding "excellent" or "very good"). Clinically, most respondents were admitted to hospital on an elective basis (57.2%), remained in hospital for more than 7 days (53.4%), had at least 1 comorbid medical condition (81.6%), and were discharged home with/without support services (94.6%). Overall, patients had an average length of stay of  $10.9 \pm 8.3$  days. The demographic and clinical profile of patients varied according to the procedure type. For example, patients who underwent multiple procedures tended to be older, remain in hospital longer, and were less likely to be discharged home.

The percentage of respondents reporting "top box" responses to all survey questions is presented in [Table 3](#), once again, for the entire study cohort and stratified according to procedure type(s). Overall, 73.3% of respondents rated their overall care score as 9 or 10 out of 10 (highest). With respect to the other global rating questions, 86.2% said that they would definitely recommend the hospital to family members or friends, 85.0% of respondents rated the degree that their hospital stay helped them as 9 or 10 out of 10, and 76.8% of respondents rated their overall hospital experience as 9 or 10 out of 10.

**Table 1. Questions on the standard CPES-IC instrument with corresponding response options**

Question wording	Top box	Middle box	Bottom box
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?	9 or 10	7 or 8	0 to 6
Would you recommend this hospital to your friends and family?	Definitely yes	Probably yes	Probably no Definitely no
Overall, do you feel you were helped by your hospital stay? Please answer on a scale where 0 is “not helped at all” and 10 is “helped completely”	9 or 10	7 or 8	0-6
Overall, what is the rating of your hospital experience? Please answer on a scale where 0 is “I had a very poor experience” and 10 is “I had a very good experience”	9 or 10	7 or 8	0-6
During this hospital stay, how often did nurses treat you with courtesy and respect?	Always	Usually	Sometimes Never
During this hospital stay, how often did nurses listen carefully to you?	Always	Usually	Sometimes Never
During this hospital stay, how often did nurses explain things in a way you could understand?	Always	Usually	Sometimes Never
During this hospital stay, after you pressed the call button, how often did you get help as soon as you wanted it?	Always	Usually	Sometimes Never
How often did you get help in getting to the bathroom or in using a bedpan as soon as you wanted?	Always	Usually	Sometimes Never
During this hospital stay, how often did doctors treat you with courtesy and respect?	Always	Usually	Sometimes Never
During this hospital stay, how often did doctors listen carefully to you?	Always	Usually	Sometimes Never
During this hospital stay, how often did doctors explain things in a way you could understand?	Always	Usually	Sometimes Never
During this hospital stay, how often were your room and bathroom kept clean?	Always	Usually	Sometimes Never
During this hospital stay, how often was the area around your room quiet at night?	Always	Usually	Sometimes Never
During this hospital stay, how often was your pain well controlled?	Always	Usually	Sometimes Never
During this hospital stay, how often did the hospital staff do everything they could to help you with your pain?	Always	Usually	Sometimes Never
Before giving you any new medicine, how often did hospital staff tell you what the medicine was for?	Always	Usually	Sometimes Never
Before giving you any new medicine, how often did hospital staff describe possible side effects in a way you could understand?	Always	Usually	Sometimes Never
Do you feel that there was good communication about your care between doctors, nurses, and other hospital staff?	Always	Usually	Sometimes Never
How often did doctors, nurses, and other hospital staff seem informed and up-to-date about your hospital care?	Always	Usually	Sometimes Never
How often were tests and procedures done when you were told they would be done?	Always	Usually	Sometimes Never
During this hospital stay, did you get all the information you needed about your condition and treatment?	Always	Usually	Sometimes Never
Did you get the support you needed to help you with any anxieties, fears, or worries you had during this hospital stay?	Always	Usually	Sometimes Never
Were you involved as much as you wanted to be in decisions about your care and treatment?	Always	Usually	Sometimes Never
Were your family or friends involved as much as you wanted in decisions about your care and treatment?	Always	Usually	Sometimes Never
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?	Yes	n/a	No
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?	Yes	n/a	No
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?	Completely	Quite a bit	Partly Not at all
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?	Completely	Quite a bit	Partly Not at all
When you left the hospital, did you have a better understanding of your condition than when you entered?	Completely	Quite a bit	Partly Not at all

CPES-IC, Canadian Patient Experience Survey—Inpatient Care; n/a, not applicable.

**Table 2. Demographic and clinical profile of survey respondents (n = 1082 unless otherwise noted)**

Variable	All patients	CABG only (n = 527)	Valve only (n = 416)	CABG + valve (n = 139)
Sex				
Male	799 (73.8)	435 (82.5)	260 (62.5)	104 (74.8)
Female	283 (26.2)	92 (17.5)	156 (37.5)	35 (25.2)
Age group, y				
18-59	305 (28.2)	140 (26.6)	154 (37.0)	11 (7.9)
60-69	388 (35.9)	225 (42.7)	116 (27.9)	47 (33.8)
70 and older	389 (35.9)	162 (30.7)	146 (35.1)	81 (58.3)
Education level (n = 1057)				
High school not completed	201 (19.0)	102 (19.8)	69 (16.9)	30 (22.6)
High school or college	568 (53.7)	271 (52.5)	228 (55.9)	69 (51.9)
University (any or completed)	288 (27.3)	143 (27.7)	111 (27.2)	34 (25.6)
Self-reported physical health (n = 1070)				
Excellent	122 (11.4)	63 (12.2)	48 (11.6)	11 (7.9)
Very good	351 (32.8)	161 (31.2)	143 (34.5)	47 (33.8)
Good	426 (39.8)	214 (41.5)	155 (37.4)	57 (41.0)
Fair	147 (13.7)	68 (13.2)	58 (14.0)	21 (15.1)
Poor	24 (2.2)	10 (1.9)	11 (2.7)	3 (2.2)
Self-reported mental health (n = 1076)				
Excellent	323 (30.0)	152 (29.0)	126 (30.5)	45 (32.4)
Very good	426 (39.6)	214 (40.8)	155 (37.5)	57 (41.0)
Good	253 (23.5)	119 (22.7)	105 (25.4)	29 (20.9)
Fair	66 (6.1)	35 (6.7)	23 (5.6)	8 (5.8)
Poor	8 (0.7)	4 (0.8)	4 (1.0)	0 (0.0)
Admission type				
Urgent	463 (42.8)	312 (59.2)	97 (23.3)	54 (38.9)
Elective	619 (57.2)	215 (40.8)	319 (76.7)	85 (61.2)
Length of stay, d				
< 3	11 (1.0)	0 (0.0)	11 (2.6)	0 (0.0)
3-7	493 (45.6)	228 (43.3)	215 (51.7)	50 (36.0)
> 7	578 (53.4)	299 (56.7)	190 (45.7)	89 (64.0)
Number of comorbid conditions				
None	199 (18.4)	63 (12.0)	123 (29.6)	13 (9.4)
1	431 (39.8)	210 (39.9)	163 (39.2)	58 (41.7)
2 or more	452 (41.8)	254 (48.2)	130 (31.3)	68 (48.9)
Discharge disposition				
Home (with or without support)	1023 (94.6)	503 (95.5)	403 (96.9)	117 (84.2)
All other locations	59 (5.5)	24 (4.6)	13 (3.1)	22 (15.8)

CABG, coronary artery bypass graft.

Beyond the global rating questions, on an overall basis, the top 5 performing questions pertained to patients having had a discussion about the help needed after hospital discharge (96.6% responding “yes”), receiving written discharge information (93.2% responding “yes”), having been treated with courtesy and respect by nurses (88.3% responding “always”), having been treated with courtesy and respect by doctors (85.2% responding “always”), and staff having done everything they could to help with patients’ pain (81.1% responding “always”). Conversely, the 5 lowest performing questions pertained to quietness of the hospital environment at night (34.8% responding “always”), staff discussing possible side effects of new medications (44.9% responding “always”), cleanliness of the hospital room/bathroom (58.4% responding “always”), patients reporting receiving timely assistance after pressing the call button (63.5% responding “always”), and patients reporting being involved in decisions about their care (66.4% responding “always”).

The percentage of respondents who reported a “top box” answer to each survey question was quite consistent across the surgical procedures studied. Statistically significant differences in percentage of “top box” responses were observed for only 3 questions. These questions pertained to quietness of the hospital environment at night (higher percentage reported by

patients who underwent CABG and valve replacement;  $P = 0.01$ ), patients receiving necessary information about their condition and treatment (higher percentage reported for isolated CABG;  $P = 0.04$ ), and patients having a better understanding of their condition at hospital discharge (higher percentage reported by patients who underwent a CABG alone or in combination with valve replacement;  $P = 0.01$ ).

Table 4 shows the results of the multivariate logistic regression. Odds of reporting a “top box” overall experience rating was associated with age, education level, and self-reported mental health. When compared with respondents 70 years and older, those aged 18 to 59 years reported lower odds of having an overall experience rating of 9 or 10 (odds ratio = 0.53, 95% confidence interval [CI]: 0.36-0.79). When compared with respondents with a university-level education, those who did not complete high school (adjusted odds ratio [aOR] = 2.09, 95% CI: 1.30-3.36) or with a high school or college education (aOR = 1.51, 95% CI: 1.07-2.14) had higher odds of reporting a “top box” rating. When compared with respondents who reported having excellent mental health, those reporting very good or good (aOR = 0.43, 95% CI: 0.29-0.63) and fair or poor (aOR = 0.20, 95% CI: 0.10-0.38) had lower odds of reporting a “top box” rating. The c-statistic for the overall model was 0.680.

**Table 3.** Percent of respondents with “top box” responses, by survey questions and procedures

Item description	“Top box” response	All patients	CABG only	Valve only	CABG and valve	P
Global ratings						
Overall rating of care	9 or 10	73.3	72.5	74.1	73.9	0.84
Recommendation of hospital	Definitely yes	86.2	86.5	85.4	87.5	0.81
Helped by hospital stay	9 or 10	85.0	85.3	84.0	87.0	0.68
Overall hospital experience	9 or 10	76.8	76.3	76.0	81.2	0.43
Care from nurses						
Nurse courtesy and respect	Always	88.3	89.9	85.5	90.7	0.08
Nurse listening	Always	74.9	76.9	71.9	76.3	0.20
Nurse explanations	Always	77.6	79.6	74.7	78.4	0.20
Call button assistance	Always	63.5	64.3	62.5	64.0	0.87
Timely bathroom assistance	Always	69.8	68.1	72.2	69.9	0.54
Care from doctors						
Doctor courtesy and respect	Always	85.2	85.4	85.4	84.0	0.92
Doctor listening	Always	79.6	79.4	80.2	79.0	0.94
Doctor explanations	Always	77.0	78.1	75.6	77.4	0.66
The hospital environment						
Room cleanliness	Always	58.4	58.8	56.2	63.5	0.31
Room quietness	Always	34.8	31.2	35.4	47.1	0.01
Pain control and medications						
Pain controlled	Always	68.4	68.1	68.4	69.6	0.95
Staff helped with pain	Always	81.1	80.1	81.2	84.8	0.52
Purpose of new medications	Always	74.3	76.5	73.3	69.0	0.22
Side effects of new medications	Always	44.9	46.2	45.4	38.7	0.37
Processes of care						
Communication between staff	Always	70.4	71.4	69.2	69.9	0.75
Staff informed/up to date	Always	69.4	69.0	68.3	74.5	0.38
Tests/procedures done on time	Always	77.8	78.5	76.9	77.9	0.87
Info about condition/treatment	Always	78.8	81.8	77.0	73.0	0.04
Support for anxieties/worries/fears	Always	67.5	67.8	66.6	68.6	0.91
Patient involvement in care	Always	66.4	65.4	67.1	68.2	0.77
Family/friend involvement in care	Always	78.7	78.3	79.1	79.3	0.95
Hospital discharge						
Help needed after discharge	Yes	96.6	96.6	97.5	94.1	0.21
Received written discharge info	Yes	93.2	92.2	95.1	90.7	0.12
Understanding of medications	Completely	80.7	80.5	81.9	77.9	0.59
Info about postdischarge worries	Completely	78.1	79.3	78.4	72.8	0.26
Better understanding of condition	Completely	72.6	76.6	66.4	76.3	0.01

CABG, coronary artery bypass graft.

## Discussion

Validated surveys are a valuable means for obtaining patient-reported experiences. In providing first-hand accounts of their interactions with the health care system and staff, patients can indicate high-performing areas, as well as areas of focus for quality improvement. The results in the present study were generally quite positive. Approximately three-quarters (73.3%) of the patients who completed the survey rated their overall care as 9 or 10 out of 10. Furthermore, 86.2% of respondents stated “definitely, yes” when asked whether they would recommend the hospital to family members or friends. With respect to questions pertaining to specific aspects of care, the top performing questions were about discharge planning (discussion of help needed when returning home and receiving written discharge instructions), being treated with courtesy and respect by nurses and doctors, and hospital staff doing everything they could to help with patients’ pain. On the other hand, patients identified several areas where improvements could be made. Respondents stated that they were often not told about the potential side effects of new medications, that their hospital environment was quite noisy at night, and that their room and bathroom were not always clean. These responses represent actionable items, which, if improved, may also have positive impacts on patient safety through reduced number of adverse

medication events, better patient sleep (contributing to better recovery), and a possible reduction in the rate of hospital-acquired infection. Our results also identified opportunities for improvement through increasing patient involvement in their care decisions, as well as a need for greater discussion around patient worries, fears, and anxieties. This is especially important, as patients have fears and worries that extend far beyond the inpatient setting. Once returning home, patients who have undergone cardiac surgery are faced with the possibility of complications, modifications to their lifestyle/behaviours, and concerns about resuming their work or normal daily activities in a safe way.<sup>26,27</sup> These are the areas that also fall under the umbrella of PCC. In addressing these, we can ensure that patient needs are met in a holistic fashion.<sup>1</sup> With respect to overall experience, odds of reporting a “top box” rating was associated with respondent age, education level, and self-reported mental health. This suggests that not all groups of cardiac surgery patients may respond similarly to the survey. Further analyses among these groups may provide information to assist in the provision of PCC.

Although there is not a great deal of previous literature in this area, our results are similar to those published in 2004 by the National Framework for Coronary Heart Disease survey of patients in the United Kingdom.<sup>28</sup> In that survey, 51% of

**Table 4. Logistic regression results (odds of having an overall hospital experience rating of 9 or 10 out of 10)**

Variable	OR	95% CI
Sex		
Male	1.19	0.84-1.69
Female	1.00	—
Age, y		
18-59	0.53	0.35-0.78
60-69	1.04	0.70-1.53
70 and older	1.00	—
Education level		
High school not completed	2.10	1.31-3.38
High school or college	1.51	1.07-2.14
University (any or completed)	1.00	—
Self-reported physical health		
Excellent	1.00	—
Very good/good	0.71	0.39-1.29
Fair/poor	0.77	0.38-1.56
Self-reported mental health		
Excellent	1.00	—
Very good/good	0.43	0.29-0.63
Fair/poor	0.20	0.10-0.38
Admission type		
Urgent	1.23	0.86-1.75
Elective	1.00	—
Surgery type		
CABG only	0.70	0.41-1.19
Valve replacement only	0.80	0.46-1.39
CABG and valve replacement	1.00	—
Number of comorbid conditions		
None	1.06	0.68-1.66
1	1.02	0.73-1.43
2 or more	1.00	—
Length of stay, d		
< 3	1.13	0.23-5.69
3-7	1.07	0.75-1.51
> 7	1.00	—
Discharge disposition		
Home (with or without support)	2.32	1.24-4.37
All other locations	1.00	—

CABG, coronary artery bypass graft; CI, confidence interval; OR, odds ratio.

patients reported receiving only partial information or no information at all concerning the side effects of medications. Furthermore, 39% of patients reported not being involved or wanting to be more involved in decisions about their care and treatment. On a positive note, as in our study, the majority of respondents reported positive interactions with health care staff, that they received information from staff in a way that they could understand, and that their pain was well controlled.

There are notable strengths to our study. To measure patient experience, we used a validated survey (CPES-IC), which included standard scripts and prompts. This ensured that all survey content as well as their conduct had a high degree of rigour. All interviewers received ongoing training, and 10% of all surveys were monitored for quality assurance purposes. To maximize the potential for respondents to participate, surveys were conducted on weekdays from 9 AM to 9 PM, and on Saturdays from 10 AM to 4 PM. When a potential respondent was not reached, interviewers continued to dial each number up to 9 times, at different times on varying days. Contact information for each potential respondent was extracted from clinical information completed at the time of hospital admission/registration. Up to 2 phone numbers were available for each patient. These numbers did not discriminate

between landline and mobile/cellular telephones. Another strength of our study was that we were able to capture the patient experience of cardiac patients in a very cost-effective manner. We were able to capitalize on existing survey and administrative data infrastructure. By linking these 2 data assets, we were able to obtain feedback from a large sample of cardiac surgery patients at no additional cost. Given the structure of AHS, where the health authority is the sole provider of inpatient care in Alberta, the data sets used in the study included all hospitals in the province. This overcomes a significant data limitation in other Canadian jurisdictions, where systems may be fragmented, resulting in an inability to link data in a comprehensive fashion. Furthermore, our data linkage methodology is easily adaptable to other clinical conditions and procedures. Lastly, as the CPES-IC survey is conducted by AHS and other organizations on an ongoing basis, the data may be monitored to make insightful comparisons. This can include comparisons within a clinical area or facility over time (eg, experience is improving/getting worse), between facilities, or between jurisdictions. All of these may facilitate mutual learnings and the spread of best practices in the spirit of the Triple Aim Framework.<sup>7</sup>

There are some notable limitations of our study. A previous study of the HCAHPS in Alberta showed that when compared with all Alberta patients who were hospitalized (eg, eligible patients who did not complete the survey), survey respondents tended to have shorter lengths of stay and fewer comorbidities.<sup>29</sup> Although this was not examined in the current study, this may have resulted in cardiac surgery patients with poorer outcomes (eg, readmissions and adverse events) not being surveyed.<sup>30</sup> Secondly, as the survey was administered via telephone, our results may not be generalizable to a mail-out format and may be prone to bias via social desirability on the part of respondents. In this regard, previous HCAHPS research has shown that phone respondents typically report higher scores when compared with mail surveys.<sup>31,32</sup> Surveys were administered up to 42 days (6 weeks) following the patient's discharge from hospital. This may have resulted in some instances of recall bias. In addition, the survey was conducted in English only among patients only, which may have precluded the participation of non-English speaking persons, as well as respondents who would otherwise be able to serve as a proxy. In our study, we used a conservative data-matching protocol, where surveys were linked to corresponding inpatient records based on exact matches of personal health number, hospital code, and discharge date. We then selected eligible cases based on the inclusion of appropriate CCI codes. Therefore, it is possible that some surveys completed by cardiac surgery patients were excluded. We propose, however, because CABG and valve replacement represent major surgeries, that they would likely be present in abstracted records. This, in combination with the high reliability of the DAD data from re-abstraction studies,<sup>33</sup> leads us to believe that the impact of this potential limitation would be quite minimal. An additional limitation pertains to the generalizability of our results. We observed that patients had very positive ratings of their care. Given that our patients were treated exclusively at large academic centres, it is plausible that differing results may be observed in nonacademic centres or in smaller, community-based hospitals.

A final study limitation pertains to the generic nature of the CPES-IC instrument. As the same questions are asked of patients across a variety of medical specialties and conditions, the “one-size, fits-all” nature of the survey meant that no in-depth cardiac surgery questions were asked. For example, we did not ask any questions pertaining to access to care (eg, wait times) or about the immediate posthospital period (eg, referral and uptake of cardiac rehabilitation). Previous research has shown these to be among the key stressors for patients who undergo cardiac surgery.<sup>34</sup> Many of these topics were on the earlier-mentioned survey from the United Kingdom.<sup>24</sup> To address this gap, in collaboration with patient advocates, our research team is currently conducting a study to co-create a survey/additional questions specifically for cardiac surgery patients in the Canadian context. In addition, despite the generic nature of the CPES-IC instrument, further research and data mining may reveal actionable findings. An example of this is the finding relative to night noise in hospitals. A good sleeping environment has been identified as a key aspect of senior-friendly hospital care, the presence of which having been shown to reduce the incidence of delirium in at-risk hospitalized seniors.<sup>35</sup> An examination of our own survey data revealed a link between night noise and unplanned readmissions, although that investigation included all survey respondents over a 1-year period, as opposed to focusing on specific cohorts.<sup>36</sup> This also presents further opportunities to explore our cohort in further research, within the context of “post-hospital syndrome”—a phenomenon presented by Krumholz et al. in 2013.<sup>37</sup>

## Conclusions

Standardized collection and reporting of the patient experience are instrumental for improvements in PCC. Patients from 2 surgical centres in Alberta provided their responses to a validated survey about their experiences with care. Their feedback has generated new patient-centred knowledge about areas where they believe care for CABG and valve replacement are performing well. Despite the positive feedback, they have also identified targeted areas for quality improvement, which, if improved upon, may result in improved outcomes as per the Triple Aim Framework. Further research to compare patient-reported experience and outcomes is necessary in this clinical population. Our data linkage methods may be easily replicated to examine the comprehensive experience of other demographic and clinical cohorts as well. The integration of the “patient voice” via experience surveys within quality improvement work may result in further improvements in patient outcomes after cardiac surgery. By providing targeted, actionable, patient-reported data, we may see additional improvements in mortality, unplanned readmissions, and adverse events beyond what has been achieved to date.

## Acknowledgements

The authors acknowledge Ting (Grace) Wang and the team of interviewers from Primary Data Support (Alberta Health Services) for their assistance with data collection and abstraction for this study. They also wish to thank the patients who graciously took the time to complete the survey.

## Funding Sources

This study was supported by the Canadian Institutes of Health Research (CIHR)—Frederick Banting and Charles Best Canada Graduate Scholarship, Doctoral Award.

## Disclosures

The authors have no conflicts of interest to disclose.

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