# The new cardiac surgery patient: defying previous expectations

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**Background:** Studies conducted before 1999 of patients who had coronary artery bypass graft surgery (CABG) have shown a tendency toward increasing preoperative risk factors. This study examines whether this trend of increasing risk in patients who have cardiac surgery has continued since 1999 and whether its effect on mortality and morbidity has changed. **Methods:** We prospectively collected data for 2754 patients who had cardiac surgery, divided them into 4 cohorts based on the year of operation (2000–2003) and analyzed the data according to 56 predefined preoperative, operative and postoperative variables. **Results:** There were no significant changes in most preoperative risk factors over time, except for significant decreases in the proportion of elective ($p$ = 0.016) and emergency/salvage operations ($p$ < 0.001) and increases in urgent procedures and in the number of patients with congestive heart failure (CHF) ($p$ < 0.001). The proportion of CABG procedures decreased significantly, whereas the proportion of valve, CABG plus valve, and non-CABG surgeries increased. A significant increase in multiarterial graft use and a decrease in off-pump coronary artery bypass procedures were observed. Postoperative complication rates did not change during the 4 years except for a significant decrease in wound infections. No significant changes in overall mortality and mortality across types of procedure were observed. Median observed/expected ratios for expected length of stay in hospital and risk of mortality did not change significantly over time. **Conclusion:** Patients' risk factors, except for CHF, did not change from 2000 to 2003. Despite more complicated procedures, the postoperative complication rates did not change except for a decrease in wound infections. These results suggest that the assumption of an inexorably increasing patient risk profile should be re-evaluated.

**Contexte :** Des études réalisées avant 1999 auprès de patients ayant subi un pontage aortocoronarien (PAC) ont révélé une tendance à la hausse des facteurs de risque préopératoire. Dans la présente étude, les chercheurs voulaient déterminer si cette tendance à la hausse du risque chez les patients qui subissent une chirurgie cardiaque se maintient depuis 1999 et si son effet sur la mortalité et la morbidité a changé. **Méthode :** Nous avons recueilli prospectivement des données sur 2754 patients ayant subi une chirurgie cardiaque; nous avons réparti les patients en quatre cohortes fondées sur l'année de l'intervention (2000–2003) et analysé les données en fonction de 56 variables préopératoires, opératoires et postopératoires définies. **Résultats :** La plupart des facteurs de risque préopératoire n'ont pas changé significativement au fil du temps, sauf pour des diminutions importantes du pourcentage des interventions électives ($p$ = 0,016) et des interventions de première urgence ou de sauvetage ($p$ < 0,001), et des augmentations des interventions d'urgence et du nombre de patients atteints d'insuffisance cardiaque globale (ICG) ($p$ < 0,001). Le pourcentage des PAC a diminué considérablement, tandis que celui des chirurgies valvulaires, des PAC combinés à une chirurgie valvulaire et des interventions autres que les PAC a augmenté. On a observé une augmentation importante de l'utilisation de greffons multiartériels et une diminution des pontages aortocoronariens sans circulation extracorporelle. Les taux de complications postopératoires n'ont pas changé pendant la période de quatre ans, sauf pour une diminution importante des infections des plaies. On n'a observé aucun changement important de la mortalité globale et de la mortalité selon les types d'intervention. Les ratios observés/attendus médians de la durée prévue du séjour à l'hôpital et du risque de mortalité n'ont pas changé significativement au fil du temps.

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**Conclusion :** Les facteurs de risque des patients, sauf pour l'ICG, n'ont pas changé de 2000 à 2003. Même si les interventions sont plus compliquées, les taux de complications postopératoires n'ont pas changé, sauf pour une diminution des infections des plaies. Ces résultats indiquent qu'il faudrait réévaluer l'hypothèse selon laquelle le profil de risque des patients augmente inexorablement.

Coronary artery bypass graft surgery (CABG) is one of the most intensely scrutinized procedures in medicine. With this in mind, studies conducted at numerous cardiac care centres before 1998 of the demographics of patients who had CABG showed a trend toward greater preoperative risk factors — in other words, patients who had cardiac surgery were getting older and sicker, with coexisting problems such as renal disease, diabetes, peripheral vascular disease (PVD) and chronic obstructive pulmonary disease (COPD). Despite the increased risk, the mortality and postoperative morbidity had remained stable or declined according to most studies, suggesting that surgeons and cardiac care staff had been successful in mitigating this increased risk.[1–6] Careful study of patient demographics is important, because it will influence patient management at every stage of care, as well as helping direct future research in patient assessment, cardiac care practices and economic analysis.

The most relevant and recent Canadian study was that by Abramov and associates[1] at the Sunnybrook and Women's College Health Sciences Centre, Toronto, Ont., in 2000. Looking at trends in CABG over a 9-year period ending in 1998, they divided their patient population into three 3-year cohorts and examined variables such as mean age, sex and comorbid disease. Their data revealed a significant increase in most preoperative risk factors examined over time. However, postoperative complications such as myocardial infarction (MI) and overall mortality and morbidity significantly declined during the course of the study.

These data provoked 2 initial research questions: Have these same trends of increasingly high-risk patients having cardiac surgery continued since 1998? How has this affected subsequent mortality and morbidity? Before any analyses were carried out to answer these questions, we formulated 2 a priori hypotheses. The first was that the trend observed in the literature, toward an increasing prevalence of preoperative risk factors among patients who have cardiac surgery, will have continued from 1998 to the present. The second a priori hypothesis was that, despite this increase in risk, the mortality and morbidity rates would have remained stable or would have showed a decline during the past 5 years.

## Methods

In our study, we collected data concerning 2754 consecutive, unselected patients who had cardiac surgery from a database started in July 1999. The information was entered using a standardized form by our database manager. It contains data on the patients of all the cardiac surgeons at London Health Sciences Centre–University Campus. Patients were divided into 4 cohorts based on the year of operation (2000–2003), and each patient's data were examined with respect to 56 preoperative, operative and postoperative variables. These variables were defined a priori using standardized definitions of the Society of Thoracic Surgeons.[7] The 11 postoperative complications we documented were death within 30 days, neurological complications, the need for a new intra-aortic balloon pump used postoperatively for low cardiac output, reoperation for bleeding, life-threatening cardiac arrest or arrhythmia, renal failure requiring dialysis, septicemia, mediastinitis, sternal dehiscence, respiratory failure and preoperative MI. Definitions for these variables can be found in a previous publication from our centre.[8]

Statistical analyses of the data were carried out using descriptive and univariate analyses as the initial tools to determine important trends in preoperative risk factors, operative practices and postoperative complications. The univariate analyses consisted of a $\chi^2$ test for 2-way tables for linear trend of categorical variables and analysis of variance (ANOVA) for continuous variables. To more fully assess changes in mortality and morbidity, the predicted risk of mortality and predicted length of hospital stay (LOS) were determined using previously validated multivariate models of the Cardiac Care Network of Ontario only for patients who had CABG.[9,10] These predicted mortality and LOS data were then compared with the observed values of these variables, and the results were expressed as observed versus expected (O/E) ratios. Continuous variables are presented as means (and standard deviations) and categorical variables as incidence rates. A $p$ value less than 0.05 was considered significant.

## Results

There were no significant changes over time in most preoperative risk factors such as age, female sex, renal dysfunction and diabetes (Table 1). However, there were significant increases in the proportion of patients who underwent urgent (patient was in hospital awaiting operation) procedures (from 39.6% to 52.1%, $p <$ 0.001), and the presence of congestive heart failure also increased (from 2.4% to 13.7%) among patients preoperatively. Conversely, elective and emergency/salvage (patient was in intensive care unit or critical care unit with intractable angina and the operation was begun outside the normal schedule) operations significantly decreased (from 51.2% to 44.0%, $p = 0.016$, and from 9.2% to 3.9%, $p < 0.001$, respectively) over the study period. An examination of the types of procedures in the database revealed a significant decrease in the proportion of isolated CABGs (from 85.5% to 70.7%, $p < 0.001$) and significant increases in the proportion of non-CABG surgeries such as valve replacements or repairs (from 7.3% to 16.6%), combined CABG plus valve procedures (from 5.3% to 8.6%) and other cardiac surgeries (from 1.9% to 4.2%) from 2000 to 2003 ($p < 0.001$).

Analysis of operative variables (Table 2) demonstrated a significant increase in the use of more than 1 arterial graft in CABG surgeries (from 3.5% to 16.1%, $p < 0.001$), such as the left internal thoracic artery, right internal thoracic artery and radial artery. The incidence of palpable aortic atherosclerosis noted at surgery did not change significantly; however, there was a decrease in off-pump coronary artery bypass (OPCAB) procedures performed (from 29.3% to 15.9%).

The incidence of postoperative complications did not change during the 4 years of the study (Table 3). The incidence of wound infection, showed a significant decline (from 8.5% to 2.8%).

The O/E ratios for CABG mortality and LOS showed no significant change over the study period (Table 4).

## Discussion

This study showed that there has been little significant change in the preoperative risk factors of our patients, our operative practices and outcomes. The stability of preoperative risk factors among our cardiac

**Table 1**

**Trends in preoperative risk factors for all patients who had cardiac surgery (*n* = 2754)**

| Risk factor | Group; no. (and %) of patients*: 2000 *n* = 531 | 2001 *n* = 673 | 2002 *n* = 732 | 2003 *n* = 818 | *p* value (overall) | *p* value (linear trend) |
|---|---|---|---|---|---|---|
| Mean age (and SD), yr | 64.2 (11.0) | 64.2 (10.4) | 64.7 (10.7) | 64.2 (11.0) | 0.80 | |
| Urgency of procedure | | | | | | |
| Elective | 272 (51.2) | 329 (48.9) | 321 (43.9) | 360 (44.0) | 0.016 | 0.003 |
| Urgent | 210 (39.6) | 286 (42.5) | 361 (49.3) | 426 (52.1) | < 0.001 | < 0.001 |
| Emergency / salvage | 49 (9.2) | 58 (8.6) | 50 (6.8) | 32 (3.9) | < 0.001 | < 0.001 |
| Mean preoperative LOS (and SD), d† | 11.1 (8.3) | 10.6 (7.9) | 9.9 (7.9) | 9.7 (8.2) | 0.07 | |
| Female sex | 143 (26.9) | 170 (25.3) | 195 (26.6) | 211 (25.8) | 0.90 | |
| Procedure | | | | | | |
| CABG | 454 (85.5) | 527 (78.3) | 526 (71.9) | 578 (70.7) | < 0.001 | |
| Valve replacement or repair | 39 (7.3) | 82 (12.2) | 117 (16.0) | 136 (16.6) | | |
| CABG + valve replacement or repair | 28 (5.3) | 42 (6.2) | 50 (6.8) | 70 (8.6) | | |
| Other | 10 (1.9) | 22 (3.3) | 39 (5.3) | 34 (4.2) | | |
| Ventricular grade | | | | | | |
| 1 | 290 (54.6) | 393 (58.4) | 386 (52.7) | 483 (59.0) | 0.08 | |
| 2 | 156 (29.4) | 160 (23.8) | 215 (29.4) | 210 (25.7) | | |
| 3 | 68 (12.8) | 96 (14.3) | 114 (15.6) | 98 (12.0) | | |
| 4 | 17 (3.2) | 21 (3.1) | 15 (2.0) | 21 (2.6) | | |
| Ventricular grade 3/4 | 85 (16.0) | 117 (17.4) | 129 (17.6) | 119 (14.5) | 0.35 | |
| Preoperative IABP support | 20 (3.8) | 20 (3.0) | 28 (3.8) | 17 (2.1) | 0.17 | |
| Redo surgery | 18 (3.4) | 33 (4.9) | 36 (4.9) | 36 (4.4) | 0.55 | |
| CCS class 4 | 287 (54.0) | 380 (56.5) | 408 (55.7) | 406 (49.6) | 0.033 | 0.06 |
| Diabetes | 129 (24.3) | 161 (23.9) | 193 (26.4) | 200 (24.4) | 0.71 | |
| Cerebrovascular disease | 61 (11.5) | 84 (12.5) | 80 (10.9) | 94 (11.5) | 0.84 | |
| BMI > 30 | 191 (36.0) | 220 (32.7) | 283 (38.7) | 290 (35.5) | 0.14 | |
| COPD | 80 (15.1) | 139 (20.7) | 143 (19.5) | 134 (16.4) | 0.030 | 1.00 |
| Recent MI | 129 (24.3) | 140 (20.8) | 171 (23.4) | 177 (21.6) | 0.43 | |
| PVD | 39 (7.3) | 79 (11.7) | 85 (11.6) | 80 (9.8) | 0.043 | 0.32 |
| Creatinine > 120 U/L | 62 (11.7) | 82 (12.2) | 79 (10.8) | 116 (14.2) | 0.21 | |
| CHF | 13 (2.4) | 53 (7.9) | 122 (16.7) | 112 (13.7) | < 0.001 | < 0.001 |
| Left coronary artery main disease | 106 (20.0) | 152 (22.6) | 138 (18.9) | 171 (20.9) | 0.37 | |

BMI = body mass index; CABG = coronary artery bypass graft; CCS = Canadian Cardiac Society; CHF = congestive heart failure; COPD = chronic obstructive pulmonary disease; IABP = intra-aortic balloon pump; LOS = length of hospital stay; MI = myocardial infarction; PVD = peripheral vascular disease; SD = standard deviation.
*Unless otherwise indicated.
†Only for those patients who had a preoperative length of stay > 0 d. Comparison using the Kruskal–Wallis test yielded $p = 0.03$.

surgery population is contrary to the trends observed in the literature toward older age, female sex, hypertension, diabetes, left main coronary artery disease and acute MI (Table 1). However, this may simply represent the time period of the study. The increase in urgent procedures and decrease in elective and emergency/salvage procedures, however, is consistent with previous reports, and urgent surgery has been shown to be an independent predictor of operative mortality.[3,11] Unfortunately, trends in the incidence of congestive heart failure (CHF) were not examined in recent studies.[1,12,13] The increase of CHF in our population likely reflects a related increase in patients who had valve replacement or repair, or valve replacement or repair plus CABG, who were more prone to exhibit CHF perioperatively.

The decrease in the relative percentage of CABG procedures observed over the study period may reflect an increase in the number of patients in whom CABG might have been appropriate who are amenable to stent placement. However, this decrease is contrary to that which was observed by Abramov and colleagues[1] and by Ghali and colleagues.[2] The increase in valve procedures, which is consistent with a recent report by Hassan and coworkers,[14] could be the result of an increasing prevalence of non-rheumatic valve disease due to an aging population or elderly patients increasingly expecting to receive such procedures. In addition, there has been an increasing tendency toward a more liberal application of early valve repairs. These trends underscore the importance of developing predictive mortality and morbidity models for valve surgeries.

The observed increase in the use of multiarterial grafting is a promising sign, because studies have suggested that it is associated with fewer cardiac events and prolonged survival.[15–17] The decrease in the percentage of OPCAB cases reflects the lack of significant reductions in perioperative mortality, stroke and MI in patients who have OPCAB as opposed to those who have on-pump CABG, as demonstrated in a recent meta-analysis.[18]

The incidence of postoperative complications, median stay in an intensive care unit and median hospital LOS showed no appreciable difference across the years except for a decline in wound infection rates, which is an important quality assurance variable. This is consistent with the results obtained by Abramov and associates,[1] although they observed a decline in postoperative MI rates. Overall mortality rates remained stable, as did mortality rates when stratified according to procedure (Table 3). (Although the mortality rate for CABG plus valve procedures decreased, this change was not statistically significant.) This may reflect the role of improved patient care practices at our centre. Unlike most other studies, we calculated O/E ratios as a risk-adjusted indicator of postoperative mortality and found no significant changes over the study period. This was understandable considering the stable severity of preoperative risk factors in our patients.

At the outset, we carefully considered the limitations and strengths of our project. This study is limited by being prospective and, thus, known and unknown variables and biases may be introduced. Nonetheless, a recent study has shown that treatment results from prospective cohort studies like this one are often similar

**Table 2**

**Trends in operative practices only in patients who had coronary artery bypass graft surgery (*n* = 2085)**

| Operative practice | Group; no. (and %) of patients* 2000 *n* = 454 | 2001 *n* = 527 | 2002 *n* = 526 | 2003 *n* = 578 | *p* value (overall) | *p* value (linear trend) |
|---|---|---|---|---|---|---|
| No. of grafts | | | | | | |
| Mean (and SD) | 3.0 (0.9) | 3.0 (1.0) | 2.9 (1.0) | 3.0 (1.0) | 0.21 | |
| Median (and range) | 3.0 (1–6) | 3.0 (1–7) | 3.0 (1–6) | 3.0 (1–8) | | |
| No. (and %)† | | | | | | |
| 1–2 | 108 (23.8) | 134 (25.4) | 155 (29.5) | 166 (28.7) | 0.022 | 0.58 |
| 3 | 237 (52.2) | 237 (45.0) | 241 (45.8) | 243 (42.0) | | |
| ≥ 4 | 109 (24.0) | 156 (29.6) | 130 (24.7) | 169 (29.2) | | |
| Arterial graft > 1 of those listed below | 16 (3.5) | 12 (2.3) | 68 (12.9) | 93 (16.1) | < 0.001 | < 0.001 |
| LITA | 431 (94.9) | 503 (95.4) | 495 (94.1) | 553 (95.7) | 0.64 | |
| RITA | 13 (2.9) | 9 (1.7) | 27 (5.1) | 38 (6.6) | < 0.001 | < 0.001 |
| Radial artery | 4 (0.9) | 5 (1.0) | 51 (9.7) | 68 (11.8) | < 0.001 | < 0.001 |
| Aortic atherosclerosis‡ | 55 (12.1) | 67 (12.7) | 93 (17.7) | 85 (14.7) | 0.06 | |
| OPCAB | 133 (29.3) | 114 (21.6) | 132 (25.1) | 92 (15.9) | < 0.001 | < 0.001 |

LITA = left internal thoracic artery; OPCAB = off-pump coronary artery bypass; RITA = right internal thoracic artery; SD = standard deviation.
*Unless otherwise indicated.
†Overall comparison for number of grafts using the Kruskal–Wallis test gave *p* = 0.24.
‡Data for 11 patients were unknown and, thus, those patients were placed in the "No" group.

## Table 3

**Trends in postoperative complications for all patients who had cardiac surgery (*n* = 2754)**

| | Group; no. (and %) of patients* | | | | | |
|---|---|---|---|---|---|---|
| Complication | 2000 *n* = 531 | 2001 *n* = 673 | 2002 *n* = 732 | 2003 *n* = 818 | *p* value (overall) | *p* value (linear trend) |
| Death† | 19 (3.6) | 31 (4.6) | 26 (3.6) | 28 (3.4) | 0.63 | |
| CABG | 13/454 (2.9) | 18/527 (3.4) | 14/526 (2.7) | 13/578 (2.3) | 0.70 | |
| Valve replacement or repair | 1/39 (2.6) | 4/82 (4.9) | 5/117 (4.3) | 8/136 (5.9) | 0.834 | |
| CABG + valve replacement or repair | 5/28 (17.9) | 4/42 (9.5) | 2/50 (4.0) | 4/70 (5.7) | 0.14 | |
| Postoperative IABP | 18 (3.4) | 26 (3.9) | 26 (3.6) | 30 (3.7) | 0.98 | |
| Re-intervention | 3 (0.6) | 5 (0.7) | 10 (1.4) | 8 (1.0) | 0.47 | |
| Stroke | 17 (3.2) | 23 (3.4) | 23 (3.1) | 29 (3.5) | 0.97 | |
| Reoperation for bleeding | 17 (3.2) | 14 (2.1) | 16 (2.2) | 23 (2.8) | 0.55 | |
| Wound infection | 45 (8.5) | 46 (6.8) | 36 (4.9) | 23 (2.8) | < 0.001 | < 0.001 |
| Arrest/arrhythmia | 21 (4.0) | 34 (5.1) | 35 (4.8) | 42 (5.1) | 0.77 | |
| Renal failure | 6 (1.1) | 5 (0.7) | 7 (1.0) | 11 (1.3) | 0.71 | |
| Septicemia | 13 (2.4) | 16 (2.4) | 10 (1.4) | 15 (1.8) | 0.44 | |
| Mediastinitis | 8 (1.5) | 10 (1.5) | 7 (1.0) | 8 (1.0) | 0.66 | |
| Sternal dehiscence | 5 (0.9) | 9 (1.3) | 6 (0.8) | 3 (0.4) | 0.23 | |
| Respiratory failure | 47 (8.9) | 55 (8.2) | 64 (8.7) | 60 (7.3) | 0.71 | |
| MI | 17 (3.2) | 23 (3.4) | 24 (3.3) | 26 (3.2) | 1.00 | |
| ICU LOS > 4 d | 53 (10.0) | 63 (9.4) | 68 (9.3) | 79 (9.7) | 1.00 | |
| Hospital LOS > 10 d | 69 (13.0) | 91 (13.5) | 118 (16.1) | 133 (16.3) | 0.21 | |
| ICU LOS, d | | | | | | |
| No. | 512 | 643 | 707 | 791 | | |
| Mean (and SD) | 2.3 (4.7) | 2.2 (3.8) | 2.7 (6.7) | 2.2 (4.8) | | |
| Median (and range) | 1.0 (1–49) | 1.0 (1–46) | 1.0 (1–91) | 1.0 (1–75) | | |
| *p* value (ANOVA) | 0.26 | | | | | |
| *p* value (Kruskal–Wallis) | 0.10 | | | | | |
| Hospital LOS, d | | | | | | |
| No. | 512 | 643 | 707 | 790 | | |
| Mean (and SD) | 8.7 (10.5) | 8.3 (10.2) | 8.3 (8.4) | 8.2 (8.0) | | |
| Median (and range) | 6.0 (1–96) | 6.0 (3–151) | 6.0 (3–91) | 6.0 (3–98) | | |
| *p* value (ANOVA) | 0.84 | | | | | |
| *p* value (Kruskal–Wallis) | 0.77 | | | | | |

ANOVA = analysis of variance; CABG = coronary artery bypass graft; IABP = intra-aortic balloon pump; ICU = intensive care unit; LOS = length of stay; MI = myocardial infarction; SD = standard deviation.
*Unless otherwise indicated.
†Deaths were broken down by procedure. There were also some "Other" procedures that were not included.

## Table 4

**Trends across time in observed/expected ratios only in patients who had coronary artery bypass graft surgery**

| O/E ratio | 2000 | 2001 | 2002 | 2003 | *p* value (overall)* |
|---|---|---|---|---|---|
| LOS† | *n* = 442 | *n* = 510 | *n* = 512 | *n* = 564 | |
| Mean (and SD) | 1.12 (1.16) | 1.12 (1.11) | 1.03 (0.88) | 1.03 (0.81) | 0.08 |
| Median (and range) | 0.85 (0.2–13.8) | 0.87 (0.4–14.7) | 0.83 (0.4–9.8) | 0.87 (0.4–9.2) | |
| Risk of mortality | *n* = 454 | *n* = 527 | *n* = 526 | *n* = 578 | |
| Mean (and SD) | 1.0 (7.8) | 1.3 (12.3) | 0.4 (3.5) | 0.9 (11.3) | 0.61 |
| Median (and range) | 0.0 (0–93) | 0.0 (0–216) | 0.0 (0–53) | 0.0 (0–216) | |

LOS = length of hospital stay; O/E = observed/expected; SD = standard deviation.
*Outcomes were log-transformed to improve equality of variance. Using the Kruskal–Wallis test, O/E length of hospital stay gave $p = 0.012$ and O/E risk of mortality gave $p = 0.70$.
†Because observed LOS is not available for those who died, $n = 2028$.

to treatment results from randomized controlled trials.[19]

The second limitation of our study is the possibility of variations in individual surgeons' results and the fact that 2 surgeons left our centre during the study period. Again, this was not of undue concern because the mortality and morbidity rates among our surgeons are markedly similar, and the number of patients in this study is sufficiently large to minimize these variations as a factor. Had we tried to control for surgeon variation by including only the surgeons who practised throughout the 4-year period, we would have introduced new problems such as decreased patient numbers and a higher likelihood of a type II error.

The third limitation, as in most studies, was that there might have been known and unknown variables that we did not or could not include in the study. For instance, the diffuseness of a patient's coronary artery disease and the quality of tissue are variables that are difficult to quantify and are, hence, not included in almost all surgical databases, including our own.

All data were collected prospectively using a standardized system, with unchanging, pre-set definitions of study variables. Furthermore, the sample size was large and the data collection was performed over a long enough period to potentially yield scientifically important and clinically relevant data.

We did not observe a continuing increase in preoperative morbidity as shown by Abramov and associates.[1] Although this may simply reflect the time interval we used, we do not have an earlier time frame with which to compare our data. Whereas further studies are necessary to plan more accurately for the needs of cardiac surgery patients in the future, the population seems to be currently stable regarding the preoperative characteristics and operative results that we studied.

**Competing interests:** None declared.

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