



**HAL**  
open science

## Patient-reported outcomes: validation of the French Quality of Recovery-15 score in cardiac surgery

Grégoire Le Gac, Alexandre Mansour, Martin Labory, Erwan Flecher, Céline Chabanne, Claude Ecoffey, Hélène Beloeil, Nicolas Nessler

► **To cite this version:**

Grégoire Le Gac, Alexandre Mansour, Martin Labory, Erwan Flecher, Céline Chabanne, et al.. Patient-reported outcomes: validation of the French Quality of Recovery-15 score in cardiac surgery. British Journal of Anaesthesia, 2024, 133 (2), pp.450-452. 10.1016/j.bja.2024.04.056 . hal-04646806

**HAL Id: hal-04646806**

**<https://hal.science/hal-04646806v1>**

Submitted on 19 Jul 2024

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution - NonCommercial 4.0 International License

1 **Patient reported outcomes: validation of the quality of recovery-15 score in cardiac**  
2 **surgery**

3 Authors:

4 Grégoire LE GAC M.D.<sup>1,2,3</sup>; Alexandre MANSOUR M.D., Ph.D.<sup>1,3,4</sup>, Martin LABORY M.D.<sup>1</sup>;  
5 Erwan FLECHER M.D., Ph.D.<sup>5,6</sup>, Céline CHABANNE M.D.<sup>5</sup>, Claude ECOFFEY M.D., Ph.D.<sup>1</sup>;  
6 Hélène BELOEIL M.D., Ph.D.<sup>1,2,3</sup>; Nicolas NESSELER M.D., Ph.D.<sup>1,3,7</sup>.

7  
8 **Short Title:** Patient reported outcome in cardiac surgery

9  
10  
11 <sup>1</sup> Department of Anesthesia and Critical Care, Pontchaillou, University Hospital of Rennes,  
12 France

13 <sup>2</sup> INSERM, Univ Rennes, CHU Rennes, Department of Anesthesia and Critical Care, CLCC  
14 Eugène Marquis, COSS [(Chemistry Oncogenesis Stress Signaling)] – UMR\_S 1242, F-35000  
15 Rennes

16 <sup>3</sup> Univ Rennes, CHU Rennes, Inserm, CIC 1414 (Centre d'Investigation Clinique de Rennes),  
17 F35000 Rennes, France

18 <sup>4</sup> Univ Rennes, CHU de Rennes, Inserm, IRSET, UMR\_S 1085, F35000 Rennes, France

19 <sup>5</sup> Department of Thoracic and Cardiovascular Surgery, Pontchaillou, University Hospital of  
20 Rennes, France

21 <sup>6</sup> Univ Rennes, CHU de Rennes, Inserm, LTSI, U1099, F35000 Rennes, France

22 <sup>7</sup> Univ Rennes, CHU de Rennes, Inra, Inserm, Institut NUMECAN – UMR\_A 1341, UMR\_S  
23 1241, F-35000 Rennes, France

24 Corresponding author:

25 Grégoire LE GAC, Hôpital Pontchaillou Grégoire LE GAC, Hôpital Pontchaillou, Département  
26 d'Anesthésie-Réanimation et Médecine Péri-Opératoire, 2 rue Henri Le Guilloux, 35033  
27 Rennes Cedex 9, France.

28 Tel.: +33.2.99.28.91.53; Fax: +33.2.99.28.24.21; E-mail: [Gregoire.le.gac@chu-rennes.fr](mailto:Gregoire.le.gac@chu-rennes.fr)

29  
30 Keywords: patient-reported outcomes, cardiac surgery, perioperative medicine, quality of  
31 recovery, critical care.

34 The increasing number of individuals undergoing surgical procedures has made the  
35 improvement of postoperative recovery a major global health concern<sup>1-3</sup>. The 15-item Quality  
36 of Recovery (QoR-15) score, introduced in 2012<sup>4, 5</sup>, is one example of a patient-centred  
37 outcome measure designed for perioperative medicine. This score has been validated in the  
38 French language<sup>6, 7</sup>. However, the QoR-15 has not been validated in the setting of cardiac  
39 surgery, which involves invasive procedures under cardiopulmonary bypass (CPB), followed  
40 by systematic admission in the intensive care unit (ICU)<sup>8</sup> with a moderate to high rate of  
41 complications<sup>9, 10</sup>. This study aimed to validate the French version of the QoR-15 score in a  
42 cohort of cardiac surgical patients.

43  
44 This prospective observational cohort study (NCT05684354) received ethical approval (Ethic  
45 Committee CPP Est IV, France; 22.01827.000088; 07/22/2022). Oral informed consent was  
46 obtained from all participating patients prior to inclusion, following oral and written information  
47 provided either the day before or on the morning of the surgery. We included all consecutive  
48 adult patients scheduled for cardiac surgery under CPB. Adults subject to legal protection or  
49 undergoing non-elective surgery were not included. We used the French version of the QoR-  
50 15<sup>6</sup>. The preoperative QoR-15 was performed at baseline, either the day before or on the  
51 morning of the surgery. All patients were admitted to the cardiothoracic ICU for a minimum of  
52 24 hours immediately following surgery, and subsequently transferred to the cardiothoracic  
53 surgery ward. To account for this post-operative management and to assess the overall patient  
54 stay, the postoperative QOR-15 was measured after ICU discharge in the cardiothoracic  
55 surgery ward on the 7th postoperative day. If a patient was discharged before day 7, or had  
56 an extended ICU stay, the QOR-15 was conducted on the day of, or the day before, discharge.  
57 Patients completed the questionnaire independently, but assistance from one of the  
58 investigators was available if needed. Based on previous studies<sup>5,6</sup>, the primary outcome was  
59 the convergent validity (accuracy) of the QoR-15 score in measuring the quality of  
60 postoperative recovery. Patients were asked to evaluate their global postoperative recovery  
61 using a Visual Analog Scale (VAS) ranging from 0 to 100, where 0 indicated the worst possible  
62 recovery and 100 the best<sup>5</sup>. Secondary outcomes included construct validity, reliability  
63 (consistency of the scale), responsiveness (ability to detect clinically important changes), and  
64 feasibility (practical applicability of the scale). Further details on study design, inclusion and  
65 exclusion criteria, data collection and sample size calculation are available as Supplementary  
66 Data.

67  
68 Over a three-month period in 2022, 189 patients were identified as eligible, with 146 ultimately  
69 included in the study (Supplementary Figure 1). Patient and perioperative characteristics are  
70 reported in Table 1. The distribution of surgical procedures was as follows: 18 (12%) aortic  
71 surgeries, 53 (36%) coronary artery bypass grafting surgeries (CABG), 55 (38%) valvular  
72 surgeries, and 20 (14%) mixed surgeries (valvular and CABG). The median duration of CPB

73 was 105 [82, 135] minutes (n=146). The mean change between preoperative and  
74 postoperative QoR-15 was -12 (23) (n=137). The distribution of the postoperative QoR-15 is  
75 shown in Supplementary Figure 2 and a detailed breakdown of each item and the mean  
76 change in QoR-15 from preoperative to postoperative period are reported in Supplementary  
77 Table 1. The mean global postoperative recovery assessment was 59 (20) (n=145).

78 A positive correlation was observed between the postoperative QoR-15 score and the global  
79 postoperative recovery assessment, with a Pearson coefficient of 0.48 (95% confidence  
80 interval [0.34–0.59];  $p < 0.001$ ). The correlation between  $\Delta$ QoR-15 (difference between pre and  
81 postoperative QoR-15) and the global recovery assessment was similar, with a Pearson  
82 coefficient of 0.47 (95% CI [0.32–0.59];  $p < 0.001$ ). Inter-item correlation matrix is presented in  
83 Supplementary Table 2 and showed a strong correlation between each item. A significant  
84 negative association was found between the postoperative QoR-15 score the duration of CPB  
85 ( $r = -0.09$ ;  $p = 0.038$ ), ICU length-of-stay (LOS) ( $r = -2.11$ ;  $p = 0.034$ ), duration of pleural chest tube  
86 use ( $r = -3.80$ ;  $p = 0.015$ ), and the total dose of morphine use ( $r = -0.20$ ;  $p = 0.006$ ). There was no  
87 significant association between the postoperative QoR-15 score and the type of surgery,  
88 surgical revision, atrial fibrillation, mediastinal chest tube drainage duration ( $p = 0.895$ ), acute  
89 renal failure ( $p = 0.791$ ), pulmonary oedema, atelectasis and the hospital LOS. The  
90 postoperative QoR-15 was higher in the group with a high global recovery assessment  
91 ( $VAS \geq 70$ ) compared to the group with a low global recovery assessment ( $VAS < 70$ ), with 124  
92 (16) and 113 (22), respectively ( $p = 0.005$ ). There was no statistical difference in preoperative  
93 QoR-15 between groups with high or low global recovery assessment, with 129 (15) and 130  
94 (16) respectively, ( $p = 0.512$ ). Similarly, no significant difference was found between patient with  
95 or without postoperative complication in preoperative QoR-15 (131 (14) vs 129 (16);  $p = 0.558$ )  
96 or postoperative QoR-15 (122 (20) vs 116 (21)  $p = 0.116$ ). The completion rate was 94%  
97 ( $n = 138$ ) for the preoperative QoR-15 questionnaire and 99% ( $n = 145$ ) for the postoperative  
98 questionnaire. Internal consistency, measured by Cronbach's alpha, was 0.872. Cohen's effect  
99 size and standardized response mean are reported in Supplementary. Table 1.

100  
101 This study demonstrated that the QoR-15 score is a valid, responsive, reliable, and feasible  
102 tool for assessing overall quality of recovery in cardiac surgery patients. However, its validity  
103 and responsiveness were lower compared to previous studies conducted in the general  
104 surgery population, including minor and intermediate surgeries, where the QoR-15  
105 demonstrated stronger validity and responsiveness<sup>5, 6</sup>. This variation can be attributed to the  
106 delayed assessment during hospitalization, necessitated by the initial admission to the  
107 cardiothoracic ICU. The single-centre nature of this study may limit the generalization of the  
108 results, highlighting the need for further evaluation in other cardiac surgery centres.

109 In conclusion, the QoR-15 scale demonstrated acceptable levels of validity, reliability,  
110 responsiveness, and feasibility in the assessment of postoperative recovery among cardiac  
111 surgery patients. While these findings support the routine application of QoR-15, the

112 development of a patient-centred outcome measure tailored for cardiac surgery patients could  
113 be a valuable progression.

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60  
61  
62  
63  
64  
65

114

115 **Authors' contributions:** GLG,ML,NN conceived the study and elaborated the analysis plan .

1 116 GLG, AM, ML contributed to the investigation and data collection, performed the statistical

2 117 analysis, analyzed and interpreted the data . EF, CC, CE and HB contributed to the

3 118 investigation. GLG, AM and NN drafted the manuscript, which was revised for important

4 119 intellectual content by EF, CC, CE and HB. All authors approved the final work and agree to

5 120 be accountable for all aspects of the research and for the accuracy and integrity of the work.

6 121

7 122 **Funding :** None

8 123

9 124 **Declaration of interests:**

10 125 GLG declares no competing interests.

11 126 ML declares no competing interests.

12 127 AM received payments made to his institution from i-SEP for consulting fees, and from LFB,

13 128 Aguetant, Viatrix and Pfizer for lecture fees

14 129 EF declares no competing interests.

15 130 CB declares no competing interests.

16 131 CE declares no competing interests.

17 132 HB declares no competing interests.

18 133 NN declares no competing interests.

19

20

21

22

23

24

25

26

27

28

29

30

31

32

33

34

35

36

37

38

39

40

41

42

134 **References**

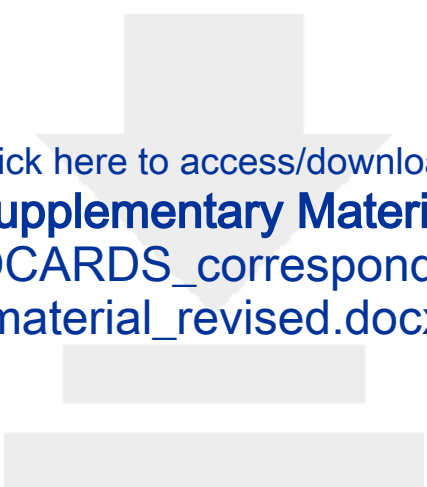
135

- 1 136 1. Weiser TG, Haynes AB, Molina G, et al. Estimate of the global volume of surgery in  
2 137 2012: an assessment supporting improved health outcomes. *Lancet Lond Engl.*  
3  
4 138 2015;385 Suppl 2:S11. doi:10.1016/S0140-6736(15)60806-6  
5  
6
- 7 139 2. Abola RE, Bennett-Guerrero E, Kent ML, et al. American Society for Enhanced Recovery  
8 140 and Perioperative Quality Initiative Joint Consensus Statement on Patient-Reported  
9 141 Outcomes in an Enhanced Recovery Pathway. *Anesth Analg.* 2018;126(6):1874-1882.  
10 142 doi:10.1213/ANE.0000000000002758  
11  
12  
13
- 14 143 3. Khan MS, Butler J. Stability of Changes in Health Status: Next Step in Comprehensively  
15 144 Assessing Patient-Reported Outcomes. *JAMA.* 2022;328(10):923-924.  
16 145 doi:10.1001/jama.2022.13551  
17  
18  
19
- 20 146 4. Myles PS, Shulman MA, Reilly J, Kasza J, Romero L. Measurement of quality of  
21 147 recovery after surgery using the 15-item quality of recovery scale: a systematic review  
22 148 and meta-analysis. *Br J Anaesth.* 2022;128(6):1029-1039. doi:10.1016/j.bja.2022.03.009  
23  
24  
25
- 26 149 5. Stark PA, Myles PS, Burke JA. Development and psychometric evaluation of a  
27 150 postoperative quality of recovery score: the QoR-15. *Anesthesiology.* 2013;118(6):1332-  
28 151 1340. doi:10.1097/ALN.0b013e318289b84b  
29  
30  
31
- 32 152 6. Demumieux F, Ludes PO, Diemunsch P, et al. Validation of the translated Quality of  
33 153 Recovery-15 questionnaire in a French-speaking population. *Br J Anaesth.*  
34 154 2020;124(6):761-767. doi:10.1016/j.bja.2020.03.011  
35  
36  
37
- 38 155 7. Léger M, Campfort M, Cayla C, Parot-Schinkel E, Lasocki S, Rineau E. Validation of an  
39 156 alternative French version of the Quality of Recovery-15 Score: the FQoR-15. *Br J*  
40 157 *Anaesth.* 2020;125(4):e345-e347. doi:10.1016/j.bja.2020.05.052  
41  
42  
43
- 44 158 8. Almashrafi A, Elmontsri M, Aylin P. Systematic review of factors influencing length of stay  
45 159 in ICU after adult cardiac surgery. *BMC Health Serv Res.* 2016;16:318.  
46 160 doi:10.1186/s12913-016-1591-3  
47  
48  
49
- 50 161 9. Welsby IJ, Bennett-Guerrero E, Atwell D, et al. The association of complication type with  
51 162 mortality and prolonged stay after cardiac surgery with cardiopulmonary bypass. *Anesth*  
52 163 *Analg.* 2002;94(5):1072-1078. doi:10.1097/00000539-200205000-00004  
53  
54  
55
- 56 164 10. Fischer MO, Brotons F, Briant AR, et al. Postoperative Pulmonary Complications After  
57 165 Cardiac Surgery: The VENICE International Cohort Study. *J Cardiothorac Vasc Anesth.*  
58 166 2022;36(8 Pt A):2344-2351. doi:10.1053/j.jvca.2021.12.024  
59  
60  
61

167 **Table 1:** Patient demographic and clinical characteristics

<b>Characteristics</b>	<b>All patients (N=146)</b>
Age (year)	69 [62, 73]
Male sex;	113 (77)
BMI	27 [24, 31]
Diabetes	33 (23)
Hypertension	81 (55)
Smoker	13 (9)
ASA score	
2	5 (3)
3	124 (85)
4	17 (12)
<b>Postoperative Characteristics</b>	
Cardiac pacing	30 (20)
Dobutamine support	17 (12)
Surgical revision	22 (15)
Total morphine in ICU (mg)	22 [9; 44]
<b>QoR-15 score</b>	
Preoperative QoR-15	133 [121, 143]; N=138
Postoperative QoR-15	112 [104, 134]; N=145
Postoperative QoR-15 measurement (days)	7 [6, 9]; N=145
<b>Postoperative complications</b>	
Atrial fibrillation	60 (41)
Postoperative myocardial infarction	0(0)
Pulmonary oedema	48 (33)
Cardiac arrest	0 (0)
Ventricular Tachycardia	0(0)
Ventricular Fibrillation	0(0)
Pleural effusion drainage	3 (2)
Pneumothorax drainage	9 (6)
Atelectasis	27 (18)
Pneumonia	2 (1)
Sepsis	5 (3)
HIT	5 (3)
Acute renal failure	2(1,4)
Stroke	3 (2)
Gastrointestinal bleeding	2 (1)
Pleural chest tube drainage duration (days)	2 [1, 6]
Mediastinal chest tube drainage duration (days)	2 [2, 3]
ICU LOS (days)	2 [2, 3]
Hospital LOS (days)	8 [7, 12]
In-hospital mortality	0 (0)
One-month mortality	0 (0)
168 <i>Qualitative parameters: Number (%).</i>	
169 <i>Quantitative parameters: Median [interquartile range]</i>	
170 <i>BMI (Body Mass Index), ASA (American Society of Anesthesiologists), CBP (Cardio</i>	
171 <i>Pulmonary Bypass), ICU (Intensive Care Unit), HIT (Heparin-Induced Thrombocytopenia),</i>	
172 <i>LOS (Length of Stay), QoR-15 (quality of recovery-15)</i>	





Click here to access/download  
**Supplementary Material**  
article\_PROCARDS\_correspondance\_suppl  
material\_revised.docx