

A prospective clinical audit to evaluate postoperative quality of recovery in adults at New Somerset Hospital, Cape Town, South Africa

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Background. Recent developments in perioperative medicine increasingly emphasise patient-centred approaches to quality of care metrics. To this end, the 15-item Quality of Recovery (QoR-15) scale is a well-validated and widely applied patient-centred measure of perioperative service quality.

Objectives. To assess quality of recovery in a South African (SA) population by applying the QoR-15 and to identify the local contributors to poor quality of recovery.

Methods. A prospective observational study was performed in all adults undergoing elective and emergency surgery during daytime hours over a 2-week period in February 2019 at New Somerset Hospital, Cape Town, SA. Patients were approached by a qualitative interviewer on day 1 post surgery for consented recruitment, collection of demographic information and application of the QoR-15 questionnaire.

Results. Of 193 patients who had surgery, 154 fulfilled our criteria and completed the questionnaire. The median QoR-15 score was 123 out of 150, which is classified as 'good', although most patients (35%) fell into the 'moderate' category (90 - 121); 59% achieved the patient acceptable symptom state score (≥ 118). The median scores of the most poorly reported QoR-15 items were 5 for 'moderate pain' and 6 for 'able to return to work or usual home activities'. Poor scoring was not related to anaesthetic modality ($p=0.088$), surgical discipline ($p=0.237$), timing of surgery ($p=0.717$) or obstetric as opposed to non-obstetric patients ($p=0.472$). Construct validity was supported by a negative correlation with duration of anaesthesia ($\rho=-0.286$; $p<0.001$) and lack of correlation with age ($\rho=-0.034$; $p=0.674$).

Conclusions. We found the QoR-15 to be a valid, feasible and acceptable tool for clinical auditing of perioperative service quality in SA. The median QoR-15 score was 123, with the majority of patients reflecting a moderate QoR. We have highlighted areas with potential for improvement and provided recommendations to address these aspects.

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Perioperative quality of care has mainly focused on significant patient outcomes such as mortality and postoperative complications, or specific patient-experienced outcomes such as pain, nausea and vomiting. However, recent developments in perioperative medicine increasingly emphasise the need for patient-centred approaches to quality of care metrics.^[1] Myles and colleagues developed a multidimensional perioperative scoring system to measure multiple patient-centred outcomes, which has been extensively validated and patient rated: the Quality of Recovery (QoR) score. Initially developed as a 9-item questionnaire,^[2] the QoR score was expanded a year later to the more extensive 40-item QoR-40,^[3] which demonstrated superior validity and reliability. In 2013, a shortened 15-item QoR-15 was developed,^[4] with the aim of simplifying patient evaluations. The QoR-15 provides an equally extensive evaluation compared with the QoR-40, while retaining the original dimensions (physical comfort, emotional state, physical independence, psychological support and pain). The questionnaire comprises 15 questions, each rated 1 - 10 (10 being the best possible state), totalling a maximum possible score of 150 (Appendix A, <http://samj.org.za/public/sup/14519.pdf>). The QoR-15 has demonstrated comparable convergent and construct validity, and acceptable reproducibility, efficiency and responsiveness, compared with the QoR-40.^[4] The QoR scales have been used in >100 perioperative studies to date.^[5]

The QoR scores have been translated and adapted for different social environments.^[5] Recently, Sikhakhane *et al.*^[6] developed and

validated an isiZulu translation of the QoR-15, demonstrating good validity of the isiZulu QoR-15 using psychometric methods. They also demonstrated that the original English QoR-15 is a valid tool for assessment of postoperative quality of recovery in a South African (SA) population. Despite its well-demonstrated utility in respect of patient-centred outcomes, the QoR scales have not been published as a clinical audit tool in SA.

Objectives

To apply the QoR-15 at a secondary-level hospital in Western Cape Province, SA, primarily to evaluate the quality of perioperative care. In addition, we hoped to establish a baseline of patient-centred outcomes following surgery, for future clinical audits in a similar setting.

Methods

The primary outcome of this study was the global QoR-15 score on day 1 postoperatively. The secondary outcomes were the prevalence of postoperative nausea and vomiting (PONV) and pain.

For quality improvement purposes, we reported on those QoR-15 items that scored lowest. We also examined for differences in scoring related to anaesthetic and surgical factors, to the same end. Lastly, we examined those parameters known to be associated with QoR scores, to assess construct validity.

Approval was granted by the Human Research Ethics Committee of the Faculty of Health Sciences, University of Cape Town (ref. no.

562/2018), as well as by the Western Cape Department of Health (ref. no. WC_201901_013). We conducted a prospective observational cohort study of all adult surgical patients between 07h00 and 17h00 over a 2-week period in February 2019 at New Somerset Hospital (NSH). All elective and emergency surgical procedures requiring general or regional anaesthesia were eligible. Participants provided informed written consent.

Exclusion criteria were a known psychiatric disturbance precluding complete co-operation, cognitive impairment (known, or suspected and confirmed using a cognitive impairment test),^[7] inability to understand English (self-professed),^[6] unavailability for interview postoperatively (day cases, transferred to another hospital, intensive care unit admissions or life-threatening complications), age <18 years, surgical procedures conducted under sedation alone, or after-hours surgery. We also excluded patients with severe pre-existing medical conditions that would limit objective postoperative assessment (e.g. tracheal intubation, uncontrolled preoperative pain).

Eligible participants were recruited on the first postoperative day in the ward. Written informed consent was obtained. Patient characteristics and perioperative data were collected retrospectively from the anaesthetic record at the time of enrolment. This information included age, gender, American Society of Anesthesiologists (ASA) classification, operation performed, division of surgery, method of anaesthesia, duration of anaesthesia, time of discharge from recovery suite, and time of interview. Thereafter, the QoR-15 questionnaire was administered. The consent, demographic data collection, QoR-15 questionnaire and data capture were all conducted by a single qualitative interviewer.

The interview process was standardised to include only those patients operated on during daytime hours.

Statistical analysis

The primary and secondary outcomes were the median overall QoR score and the median scores of the relevant individual items, respectively. A score <6 was categorised as poor. The lowest-scoring items were identified in numerical order.

The Kruskal-Wallis test was used to elucidate whether adverse scoring was associated with surgical disciplines or anaesthesia techniques, and the Mann-Whitney *U*-test to examine the influence of urgency of surgery (emergency v. elective).

To assess construct validity, we tested for association between QoR scores and age, ASA classification, gender and duration of surgery, using *t*-tests in the case of two independent groups (if parametric), or Mann-Whitney *U* (non-parametric), while analysis of variance (ANOVA) tests with Bonferroni-adjusted pairwise *t*-tests were used for more than two groups. Pearson's correlation analysis was used for continuous predictor variables that were both normally distributed, while Spearman's *rho* was used if the variables were skewed.

Data were assessed for normality, and continuous variables were presented as means and standard deviations or medians and interquartile ranges, as appropriate. Categorical variables were described using frequencies and percentages. Significance was set at $p < 0.05$. Because of the exploratory nature of the study, no power calculations were performed. Data were captured in a custom-made template on the REDCap platform and exported in comma separated values. All statistical analyses were then performed using SPSS for Windows, version 25.0 (SPSS Inc., USA).

Results

A total of 193 surgical procedures were conducted under anaesthesia during the 2-week recruitment window. The recruitment flowchart

is presented in Fig. 1. Overall, 154 participants were eligible for the postoperative assessment, giving a recruitment rate of 80%. Demographic data and clinical characteristics are set out in Table 1.

The median (interquartile range (IQR)) QoR-15 score was 123 (104 - 137) out of 150. The QoR-15 scores according to severity are presented in Fig. 2.^[8]

Floor or ceiling effects are considered to be present if >15% of participants achieve the lowest or highest possible score, respectively.^[9] Only 2 participants achieved a score <50 and 15 participants a score >145.

Most QoR-15 items had a median score of 9 - 10. Moderate pain scored 5 (IQR 0 - 10), and 'able to return to work or usual home activities' scored 6 (IQR 4 - 10).

Anaesthetic and surgical factors

There was no difference in total QoR-15 score between patients undergoing emergency v. elective surgery ($p=0.717$), between patients receiving different methods of anaesthesia ($p=0.088$), between surgical disciplines ($p=0.237$), or between obstetric as opposed to non-obstetric patients ($p=0.472$). There was also no significant difference in moderate or severe pain scores between the different methods of anaesthesia.

The QoR scores per subgroup are presented in Table 2.

Associations with quality of recovery

Women had higher total QoR-15 scores than men ($p=0.005$). There was a significant negative correlation between the total QoR-15 score

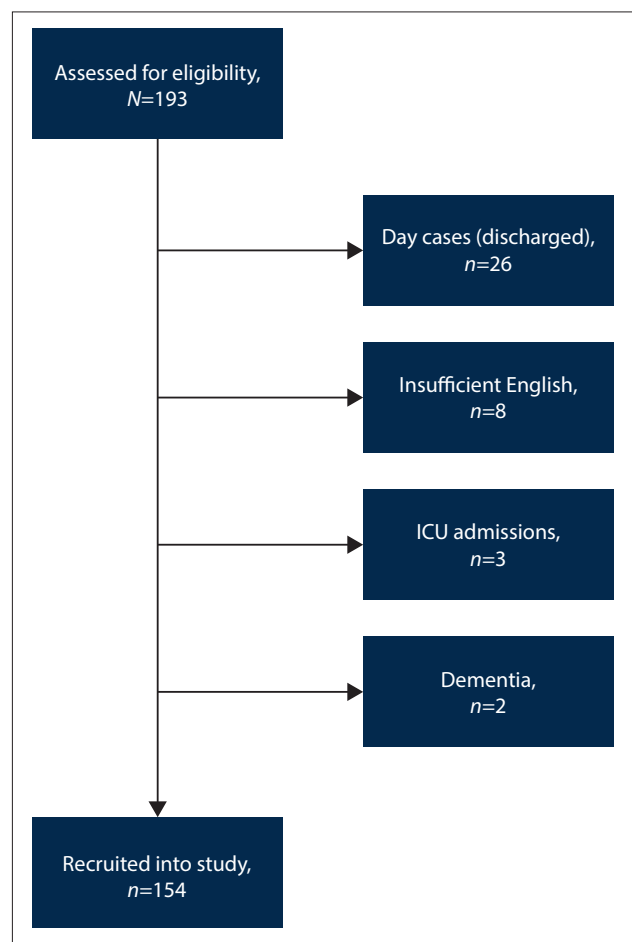


Fig. 1. Recruitment flowchart. (ICU = intensive care unit.)

Table 1. Demographic data and clinical characteristics (N=154)

Age (years)	
Mean (SD)	36 (12)
Range	18 - 74
Male gender, n (%)	29 (19)
Surgical discipline, n (%)	
General surgery	22 (14)
Orthopaedics	32 (21)
Obstetrics and gynaecology	93 (60)
Ear, nose and throat	4 (3)
Urology	3 (2)
ASA physical status, n (%)	
I	55 (36)
II	91 (59)
III	7 (4)
IV	1 (1)
Type of anaesthesia, n (%)	
General	53 (34)
Spinal	92 (60)
General + regional	1 (1)
Spinal + sedation	1 (1)
General + spinal	7 (4)
Elective surgery, n (%)	107 (69)
Duration of anaesthesia (minutes), median (IQR)	71 (59 - 95)
Timing of assessment after surgery (hours)	
Mean (SD)	12 (2.8)
Range	7.7 - 17.5

SD = standard deviation; ASA = American Society of Anesthesiologists; IQR = interquartile range.

Table 2. QoR scores per subgroup (N=154)

	QoR score, median (IQR) (maximum 150)
Gender	
Male (n=29)	112 (90 - 128)
Female (n=125)	125 (109 - 140)
Surgical discipline	
General surgery (n=22)	118 (97 - 130)
Orthopaedics (n=32)	116 (97 - 131)
Obstetrics and gynaecology (n=93)	125 (110 - 140)
Ear, nose and throat (n=4)	123 (104 - 126)
Urology (n=3)	139 (129 - 140)
ASA physical status	
I (n=55)	125 (108 - 140)
II (n=91)	122 (107 - 137)
III (n=7)	100 (74 - 108)
IV (n=1)	132*
Method of anaesthesia	
General (n=53)	123 (111 - 134)
Spinal (n=92)	123 (107 - 140)
General + regional (n=1)	80*
Spinal + sedation (n=1)	80*
General + spinal (n=7)	95 (92 - 118)
Timing of surgery	
Elective (n=107)	122 (106 - 136)
Emergency (n=47)	124 (103 - 138)

QoR = Quality of Recovery; IQR = interquartile range; ASA = American Society of Anesthesiologists.

*Single-participant categories expressed as total QoR score (out of 150).

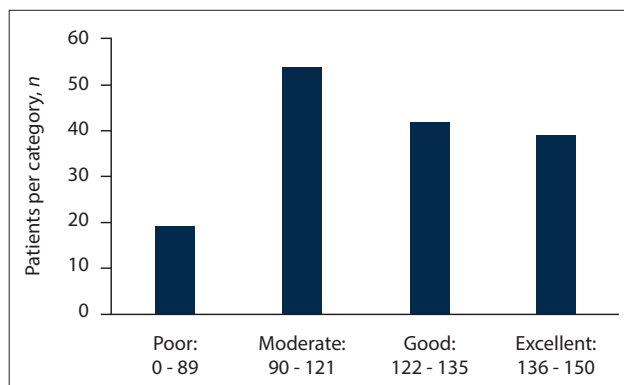


Fig. 2. Distribution of patients according to category of QoR. (QoR = Quality of Recovery.)

and duration of anaesthesia ($rho=-0.286$; $p<0.001$). There was no relationship between total QoR-15 score and age ($r=-0.034$; $p=0.674$).

There was a significant association between the total QoR-15 score and ASA classification ($p=0.041$). This association was due to significant differences between the ASA III and ASA I and II groups. There was only 1 ASA IV patient, so this group was excluded from statistical analysis.

Discussion

The principal findings were that the QoR-15 is a feasible and acceptable instrument for assessing postoperative recovery in our setting. Construct validity is supported by the lack of correlation between QoR-15 score and age,^[4,10,11] as well as the negative correlation

with duration of anaesthesia.^[4,10] We found that the QoR-15 was robust against differences between anaesthesia techniques, surgical disciplines, and timing of surgery (emergency v. elective).

A QoR-15 score of 118 has been determined as the patient acceptable symptom state,^[12] at which patients consider themselves well. In our cohort, 59% of participants achieved this threshold.

The absence of floor and ceiling effects suggests that the QoR-15 was not limited in its capacity to differentiate between participants at the extremes of good and poor recovery in our setting.

The minimal clinically important difference for the QoR-15, which is the minimal change in score that would indicate a meaningful change in a patient's health status, has been established as 8.0.^[12] With this set as an outcome measure and using this study as a benchmark, a follow-up clinical audit could be conducted to assess whether any interventions instituted have made a meaningful difference. At present, the majority of participants reflected a moderate quality of recovery.^[8]

Closing the audit loop requires that the poorest-scoring items be addressed. While PONV scored well, pain was an area that patients recorded as contributing to a poor quality of recovery. At the time of conducting this clinical audit, postoperative analgesia was prescribed almost exclusively by the surgical team, and the domain of the anaesthetist in this regard rarely extended beyond discharge of patients from recovery. Since then, a patient-controlled analgesia (PCA) service has been started at NSH. The new PCA service will begin to develop the improved use of pain assessment tools, and will be an area identified for improvement in the surgical service. As our patients were interviewed on the day immediately following surgery, it is not surprising that they did not feel able to return to work or usual home activities.

Previous studies have suggested that women have worse post-operative recovery than men.^[2,11,13] This was not observed in our study, possibly because males were under-represented (19%). Our data did not support the role of spinal anaesthesia or obstetric surgery as factors contributing to the better recovery scores of women in the cohort.

There is generally no correlation between ASA classification and total QoR-15 score.^[4,10] The significantly lower QoR-15 scores in a small number of ASA III participants in our study may be related to poor scores in the categories of moderate and severe pain in this group, with median values of 1 and 5, respectively.

The QoR-15 has been validated for telephonic interviewer-administered application,^[10] and this may have been one of the objectives behind its brevity in design compared with the QoR-40.^[4] In this light, our decision to opt for an interviewer-based clinical audit has several advantages. Our main aim was to limit reporting bias, which would have been inherent had the anaesthesia providers asked patients to rate their satisfaction with the service they themselves were providing.^[4] Furthermore, it has been shown that interviewer-administered measurement of the QoR-40 is a more efficient use of resources, as more complete and timelier data are collected.^[15]

Owing to known difficulties with making telephonic contact with patients in our setting, we opted for convenience sampling. As such, the postoperative timing of the interview was determined mainly by access to patients, yet constrained by the limited resources available in terms of a single interviewer. Owing to the wide referral drainage area supported by NSH, and resultant limited access to hospital beds, delaying assessment until a full 24 hours had passed would have reduced our recruitment rate, since many patients would have been discharged before interview. Myles *et al.*^[16] found an interview on the day after surgery to be sufficient for quality assurance purposes, and this was the most pragmatic choice for us. In our study, the mean time that elapsed between surgery and interview was therefore 12 hours.

To our knowledge, our study is the first QoR-15-based clinical audit published in an SA context, and we were able to capture an adequate sample size over the 2-week period. NSH drains a broad catchment area, and the demographic diversity of the Western Cape is therefore well represented. The low exclusion rate and unrestricted nature of our inclusion criteria resulted in a heterogeneous group, which supports generalisability of our findings to patients, types of procedures and anaesthesia modalities.

Study limitations

This study has several limitations. It was conducted in a single university-affiliated secondary-level hospital in SA. We excluded patients with poor English comprehension and severe pre-existing medical conditions, and ambulatory cases. Most other studies have taken a baseline QoR-15 preoperatively,^[4,10,17,18] although not all have done this.^[12,19] Our study did not include obtaining a preoperative baseline QoR score. We could not include all patients undergoing surgery in a 24-hour period, which would have resulted in a better representation of emergency surgery. Since the mean time that elapsed between surgery and our interview was 12 hours, patients would not have returned to their preoperative baseline score by the time they were interviewed, as QoR scores tend to increase with time^[19] and may not reach their baseline until the 7th postoperative day, depending on the nature of the surgery.^[10] Owing to the non-uniform distribution of demographic and anaesthetic factors, some categories were very small and therefore lacked the statistical power to show a difference.

We envisage that this study will serve as a benchmark for future clinical audits after service improvement steps at NSH, as well as for other secondary-level hospitals providing a similar service in SA. However, the application of our method may be limited by the fact that we were able to obtain funding for a qualitative interviewer, which may not be possible in all hospitals. For future audits, we recommend that the demographic data collection and informed consent be undertaken by the anaesthesia providers and/or recovery staff, as this aspect is not prone to reporting bias. This would significantly reduce the workload of any interviewer employed, allowing more patients to provide their scores in the allotted time. If an interviewer cannot be procured, the QoR-15 questionnaire may be administered by nursing staff, in person or telephonically. Participants could also be asked to complete the questionnaire by themselves; both methods are well established.^[10,15]

Conclusions

The QoR-15 is a valid, feasible and acceptable tool for qualitative clinical auditing of perioperative service delivery in SA. The median QoR-15 score of 123 out of 150 falls into the 'good' QoR category, although the majority reflected a 'moderate' QoR. The majority (59%) also achieved a score ≥ 118 , which is the patient acceptable symptom state. We have highlighted areas with potential for improvement at NSH and provided recommendations to address these aspects. We propose that future clinical audits explore other established methods of administering the questionnaire, in view of the limited human resources in SA.

Declaration. The research for this study was done in partial fulfilment of the requirements for MAA's MMed (Anaes) degree at the University of Cape Town.

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Conflicts of interest. None.

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