(health-related) QOL is poor. Too often, the SF-36 is used as a health-related QOL instrument, whereas it says more about the perceived health status of the respondents. Second, the authors correctly explain in the methods section that the raw scores for each of the eight dimensions of the SF-36 have to be transformed into a score ranging from 0 to 100 [1]. However, in the results, they report SF-36 scores that are higher than 100. In the discussion section, they argued, 'the authors did not transform the raw SF-36 values, allowing age- and gender-matched comparison [1].' It is surprising that the authors use this comparison as an argument for not transforming the dimension scores. There is a plethora of articles in which the dimension scores were transformed, but still compared with matched data from normative groups. The fact that the scores were not transformed to a scale from 0 to 100 might be responsible for their findings being aberrant from the previous studies that have used the SF-36 in adults with congenital heart disease. Third, the SF-36 contains eight dimensions. These dimensions can be used to compute a physical component and mental component score. In the Loup study, also an overall QOL score was calculated. Computing such an overall SF-36 score is not advocated and seems inappropriate because constructs that are conceptually different are mixed. All these factors have potentially hampered the internal validity of the study.

I join the authors in their statement that QOL research is needed to design, adapt and optimise the specific needs and complex follow-up of this special group of patients [1]. QOL studies require, however, a firm conceptual background and the use of rigorous research methods.

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Reply to the Letter to the Editor

Reply to Moons

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We thank Moons for his interest in our recent article on the quality of life in the GUCH patients [1]. This letter is in response to his valuable comments regarding our study.

In his letter, Moons emphasises that the SF 36 is most often used as a health-related quality of life instrument, whereas it says more about the perceived health status of the respondents. We agree with Mr Moons on this issue. However, the SF 36 questionnaire is a well-established tool for attempting to evaluate quality of life, and due to this 'limitation' it was applied in addition to two further questionnaires, one of the two especially created to evaluate the specific problems and also the functional status of the GUCH patients studied. Thus, not only the perceived health status was analysed, but it was also attempted to evaluate the functional status of the GUCH patients.

Regarding the concerns on some contradictions with respect to the normalising of the quality-of-life scores, we are happy to describe our methodology here in more detail. We followed the methodology applied in several previous studies and publications by our group [2,3]. First, the raw score of each of the eight dimensions of the SF 36 was transferred onto a scale from 0 to 100, as a step (technically not a necessary one) towards another transformation. This converts the scores so that the mean for each dimension is 100, giving a normal range from 85 to 115. The population mean found in the 1998 National Survey of Functional Health Status [4] serves as the reference for transformation factor in each dimension, the so-called norm-based scoring. The advantage of this process is the immediate comparability with 'normality': for each dimension's value, one can see whether or not it falls into the normal range or to what extent it deviates. This methodology is also supported by Bullinger and Kirchberger [5] and is performed by the standard software used for collecting and evaluating the SF 36 data. As the aim of our study was the comparison of our GUCH patients with the 'standard' population, we felt this method was appropriate. We disagree with Mr Moons in that such a transformation of the data could possibly lead to other findings or results. Furthermore, Moons believes that the computing of an overall SF 36 score is not appropriate, because constructs that are conceptually different are mixed. He points out that one should use the two overall scores, physical and psychological, only. We agree that calculating a mean out of different constructs should be performed carefully. This is the reason why we showed the overall SF 36 score as additional information. Our conclusions

were drawn from the results of all three different questionnaires, covering complementary aspects of daily life in GUCH patients – the SF 36 test, the HADS test and the additional GUCH-specific questionnaire. In using all three, we wanted to present a larger picture.

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Letter to the Editor

The evidence for volume–outcome relationships in thoracic aortic surgery

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Over the past several years, a large body of work has emerged investigating the association between hospital volume and surgical outcomes, primarily short-term operative mortality [1]. Although not all studies have demonstrated a statistically significant volume–outcome trend, the overall pattern in the results is overwhelmingly consistent [2]. High-volume hospitals demonstrate lower mortality rates, with the magnitude of the trend varying considerably by procedure.

In the article by Miyata et al. [3], the investigators explore the relationship of both hospital volume and surgeon volume with unadjusted and risk-adjusted mortality rates for thoracic aortic surgery in Japan. Their analysis involves 2875 patients receiving thoracic aortic surgery procedures and favouring high-volume hospitals and surgeons for better mortality outcomes. This leads the authors to conclude that the hospital rather than surgeon volume determine thoracic aortic surgery mortality outcomes. A few other groups have examined these issues using various data sources [4,5], which are consistent with the analyses of hospital volume presented by Miyata et al. [3].

Our recently conducted detailed analysis of variations in surgeon-specific outcome rates indicated the existence of considerable between-surgeon variation in outcomes, even among surgeons with similar volumes. Thus, although the magnitudes of the volume–outcome trends are modest, there may be considerable variation in outcomes that is not captured in the volume metric, perhaps because of variation in surgical technique or skill.

For cardiovascular surgical community, these types of studies indicate a need for more attention to the so-called alternative parameters such as surgical technique on variations in outcomes. At this point, one question arises: Are such variations the result of differences among surgeons in inherent technical skill or differences in experience or education?

For individual surgeons, these studies confirm once again the age-old wisdom that quality of care and the quality of surgical technique have consequences. Although not proven by any of the studies, the implication is that good technique can be learned, with subsequent improvements in outcomes. Conscientious surgeons, aware of these studies, may be motivated to assess their own outcomes and use educational opportunities to improve their performance.

Furthermore, the volume–outcome studies confirm the suspicions of patients. For thoracic aortic surgery, it matters who performs their procedure. But how should patients be advised to select a surgeon? According to the results from studies that deal with quality improvement through data from clinical databases, busier surgeons will probably have better outcomes, but how could we explain this fact to patients in the real world?

In the present study, relative importance of the various measures of volume (e.g., institutional or individual, elective or emergency cases) has not been established. Higher-volume hospitals and surgeons may simply have better processes of care, such as well-designed care plans, streamlined procedures to provide care expeditiously and greater use of evidence-based treatments that improve outcome.

Since the authors do not offer an explanation of the abovementioned parameters and have only analysed data from a regional consortium, their results should not necessarily be generalised to the other regions of the nation or of the world.

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