

## A systematic review on the quality of life benefits after aortic valve replacement in the elderly

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**Background:** Surgical aortic valve replacement is being increasingly performed in elderly patients with good perioperative outcomes and long-term survival. Evidence is limited on health-related quality of life after aortic valve replacement, which is an important measure of operative success in the elderly.

**Methods:** A systematic review of clinical studies after January 2000 was performed to identify health-related quality of life in the elderly after aortic valve replacement. Strict inclusion and exclusion criteria were applied. Quality appraisal of each study also was performed using predefined criteria. Health-related quality of life results were synthesized through a narrative review with full tabulation of the results of all included studies.

**Results:** Health-related quality of life improvements were shown across most or all domains in different health-related quality of life instruments. Elderly patients experienced marked symptomatic improvement. Health-related quality of life was equivalent or superior to both an age-matched population and younger patients undergoing identical procedures. There were excellent functional gains after surgery, but elderly patients remain susceptible to geriatric issues and mood problems. Concomitant coronary artery bypass did not affect health-related quality of life. There was a diverse range of study designs, methods, and follow-up times that limited direct comparison between studies.

**Conclusions:** Aortic valve replacement results in significant health-related quality of life benefits across a broad range of health domains in elderly patients. Age alone should not be a precluding factor for surgery. Data are heterogeneous and mostly retrospective. We recommend future studies based on consistent guidelines provided in this systematic review. (*J Thorac Cardiovasc Surg* 2013;145:1173-89)

According to the United Nations Population Division, the world's population is aging at a rapid and unprecedented rate that is expected to persist at least until 2050.<sup>1</sup> Within developed countries, the proportion of people aged more than 60 years is projected to double from 11% to 22% (2 billion people) by 2050.<sup>1</sup> By 2025, people aged more than 65 years will account for 21.3% of the population.<sup>1</sup> The number of very elderly people aged more than 80 years is projected to increase by a factor of 26 compared with a factor of 10 and 3.7 for those aged more than 60 years and the total world population, respectively.<sup>1</sup> The increasingly aging population will create an increased demand for treatment of degenerative aortic valve diseases, the most common site of valvular pathology in the elderly.<sup>2,3</sup> A quarter of the

population aged more than 65 years will have aortic sclerosis,<sup>2,4</sup> and 9% of these patients will progress to aortic stenosis over 5 years.<sup>5</sup> A large population study estimates a prevalence of 2.8% for aortic stenosis and 2.0% for aortic regurgitation in those aged more than 75 years.<sup>6</sup>

Aortic stenosis has a dismal natural course and remains one of the most common causes of morbidity and mortality in the elderly.<sup>7</sup> Without surgical intervention, 2-year mortality rates reach 90% in symptomatic patients, which is a 12-fold increased mortality risk compared with surgically treated patients.<sup>8-10</sup> Attempts at conservative treatment also are largely unsuccessful.<sup>11</sup> Rapidly improving surgical standards and postoperative care have resulted in improved survival while maintaining low operative mortality after aortic valve replacement (AVR) in the elderly.<sup>2,10,12-15</sup>

Despite good operative morbidity and mortality, these parameters alone do not give enough information on a patient's physical, functional, emotional, and mental well-being.<sup>16</sup> Postoperative health-related quality of life (HRQOL) is a primary goal of surgery in the elderly and an important aspect for many patients in their decision-making.<sup>17</sup> The challenge of surgery in this population is to provide a good HRQOL in the mid- to long-term. Evidence is accumulating on the positive HRQOL outcomes after AVR,<sup>8,12,14,15,18-32</sup> and it remains the only effective treatment option for aortic valve disease.<sup>29</sup> AVR is also highly cost-effective in the elderly population,<sup>33</sup> yet it is still withheld from elderly

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Disclosures: Authors have nothing to disclose with regard to commercial support. Received for publication Oct 6, 2012; revisions received Dec 18, 2012; accepted for publication Jan 11, 2013; available ahead of print Feb 18, 2013.

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0022-5223/\$36.00

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<http://dx.doi.org/10.1016/j.jtcvs.2013.01.004>

### Abbreviations and Acronyms

AVR	= aortic valve replacement
HRQOL	= health-related quality of life
NHP	= Nottingham Health Profile
NYHA	= New York Heart Association
QOL	= quality of life
SF-36	= Medical Outcomes Survey Short-Form 36
WHO	= World Health Organization

patients. Up to one third of patients do not receive necessary operations<sup>7,13,34</sup> despite current guidelines recommending that all elderly patients with symptomatic aortic stenosis should be considered for AVR.<sup>35</sup> Considering that life expectancy is 17.1 years at age 65 years and 8.2 years at age 80 years,<sup>1</sup> there is a significant opportunity for elderly patients to improve their HRQOL and survival if they are offered surgery.

### OBJECTIVES

We conducted a systematic review of publications from the start of this millennium to investigate the effect of AVR on HRQOL in elderly patients aged more than 70 years. This systematic review aims to (1) summarize the literature and clarify strengths and weaknesses of current evidence on HRQOL after AVR in the elderly, (2) demonstrate whether there is a HRQOL benefit in elderly patients after AVR and whether it is enough to justify surgery, and (3) outline guidelines for future research.

### MATERIALS AND METHODS

The structure of this systematic review followed previously recommended guidelines<sup>36</sup> and was written in accordance with the PRISMA checklist for systematic reviews.<sup>37</sup>

#### Definition and Measurement of Health-Related Quality of Life

The World Health Organization (WHO) has defined health as being “not only the absence of disease and infirmity but also the presence of physical, mental, and social well-being.”<sup>38</sup> HRQOL encapsulates an individual’s physical, emotional, and psychologic health, as well as social and functional status.<sup>39</sup> Because HRQOL is not a tangible entity, a standardized method of measurement is required that is reliable, valid, responsive, and sensitive, and that covers all health domains.<sup>39</sup>

In valvular heart disease, disease-specific quality of life (QOL) measures aim to accurately reflect a patient’s experience of a specific illness or its treatment. A common tool is New York Heart Association (NYHA) classification,<sup>40</sup> but the Minnesota Living with Heart Failure Questionnaire<sup>41</sup> and Kansas City Cardiomyopathy Questionnaire<sup>42</sup> also have been used. Generic HRQOL instruments are required to facilitate holistic and quantitative comparisons between different groups of patients. According to the WHO’s QOL group, any generic HRQOL instrument should include physical, psychologic, social, functional, and well-being domains.<sup>43</sup> Well-recognized HRQOL instruments in cardiac surgery are the Medical

Outcomes Survey Short-Form 36 (SF-36),<sup>44-47</sup> Nottingham Health Profile (NHP),<sup>48,49</sup> EuroQOL (EQ-5D),<sup>50</sup> and Medical Outcomes Survey Short-Form 12.<sup>51,52</sup> More detailed descriptions of each scoring system and HRQOL instrument are shown in Table 1.

### Eligibility Criteria

Study characteristics were as follows: (1) elderly patients defined as aged more than 70 years; (2) greater than 50% operations performed were AVR or AVR and concomitant CABG; (3) comparisons made with preoperative status, younger patients undergoing similar procedures, or an age-matched general population; (4) HRQOL methods of assessment and results reported; and (5) retrospective and prospective investigative studies. Report characteristics were (1) publication date during or after the year 2000, (2) fully published status, and (3) English language.

### Literature Search and Information Sources

A literature search was conducted using a MeSH keyword search via PubMed. Strict inclusion criteria for study characteristics were applied as described. On August 29, 2012, a search was conducted as described in Figure 1. A subsequent additional manual search was conducted to identify studies not covered by the initial MeSH keyword search. These manual search articles were sourced from the EMBASE, DISCOVERY, and MEDLINE databases, as well as bibliographies of each included study. Authors were e-mailed when original PDF documents could not be sourced.

### Study Selection

Two reviewers screened titles and abstracts after both MeSH keyword and manual searches. Studies were excluded if they did not meet eligibility criteria. If the information required to determine eligibility was not in the abstract, a second pass was run after data extraction. Reviewers were not blinded.

### Data Items and Collection Process

Data extraction was then performed in 2 phases by 2 reviewers using standardized pilot forms. The first phase involved assessment of study quality (Table 2), and the second phase collected results of the studies reviewed (Table 3). All data items were predetermined and specified in these tables.

### Assessment of Risk of Bias

Risk of bias in individual studies was mainly assessed by evaluating the (1) study design, (2) number of patients, (3) use of a generic HRQOL instrument, and (4) questionnaire response rates.

### RESULTS

After careful systematic selection, 19 studies were included in this systematic review.<sup>8,12,14,15,18-24,26,28-32,53,54</sup> Full details and results of reviewed articles are provided in Tables 2 and 3.

#### Early Mortality

The studies included in this review showed an acceptable early mortality after AVR (Table 4). Early mortality was generally low in contemporary studies and in isolated AVR procedures.

#### Cardiac-Specific Quality of Life Measures

Elderly patients appear to have marked symptomatic improvements after AVR. Within the first 18 months after operation, only 0% to 20% of patients are in NYHA III/IV.<sup>12,21,29</sup> The improvement in NYHA class persists

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