Follow-up papers - Cardiac general

The importance of an organized follow-up for the evaluation of mortality after hospital discharge in cardiac surgery

Luc Noyez a,*, Freek W.A. Verheugt b, Henry A. van Swieten a

a Department of Cardio-thoracic Surgery, Heart Center, Radboud University Nijmegen, 677, PO Box 9101, 6500 HB Nijmegen, The Netherlands
b Department of Cardiology, Heart Center, Radboud University Nijmegen, 677, PO Box 9101, 6500 HB Nijmegen, The Netherlands

Received 13 November 2007; received in revised form 28 January 2008; accepted 28 January 2008

Abstract

Objective: Does a structured follow-up, after cardiac surgery in an adult, provide additional information on the operation related mortality especially if mortality is used as an outcome parameter within the quality control? Method: Mortality data of 1132 patients undergoing cardiac surgery in 2003 and 2004 in the Academic Hospital Nijmegen, the Netherlands were registered by a structured follow-up one year after surgery. Results: One year after surgery this follow-up is missing information for eight patients (0.7%). Six patients (0.5%) refused further follow-up. Of the 31 patients who died during the first postoperative year, 21 (68%) were registered thanks to this structured follow-up. In 29 patients it was possible to retrieve the cause of death. Conclusion: A structured follow-up one year after cardiac surgery has a high response and not only provides a better total picture of mortality, but also information on the cause of death. Both aspects are important if mortality is used as a parameter for quality control in cardiac surgery.

Keywords: Mortality; Cardiac surgery; Follow-up; Quality control

1. Introduction

Within quality control of cardiac surgery mortality is an important outcome indicator. Of course, mortality rates must be related to the risk of mortality at the intervention, the so-called risk adjusted mortality [1]. Even more important, however, is the time at which mortality is registered and if this mortality is cardiac or non-cardiac related [2, 3]. Hospital mortality is generally used but, fundamental and clinical research prove, however, that just in cardiac surgery this hospital mortality is not a good endpoint for quality control and makes a follow-up after discharge from the hospital necessary [2–5]. After our experience with the follow-up of patients who underwent an isolated myocardial revascularization (CABG), the follow-up was reorganized and was extended to the majority of the adult patients who undergo cardiac surgery with special attention to the cause of death [5, 6]. The aim of this report is an evaluation of the response of the first follow-up year and an evaluation of the mortality information.

2. Patients and methods

2.1. Patients

In the years 2003 and 2004, 1243 adults (≥ 18 years) underwent cardiac surgery at the University Medical Center Nijmegen (UMCN) St Radboud, Nijmegen, The Netherlands. In total, 1264 cardiac operations were performed (Table 1). All discharged patients from the UMC St Radboud hospital were included in the follow-up, with the exclusion of adults with congenital heart surgery or with exceptional surgery such as, isolated coronary fistulas or myxoma. Finally, 1132 patients were included in a first-year follow-up. Independent of this follow-up, all patients were seen once at our outpatient clinic six weeks after discharge, especially for wound control. Thereafter, further control is performed by the patients’ own cardiologist.

2.2. Follow-up method

The follow-up is a fixed part of the CORRAD (Coronary Surgery Radboud Hospital) database. This database registers the pre-, per- and postoperative (in-hospital) and follow-up data of all adult patients (≥ 18 years) undergoing cardiac surgery at the UMCN. The follow-up starts the moment of discharge of the patient from the UMCN, independent of discharge to their own home, or to another hospital.

Within this follow-up there are two lines [6]. The first is not organized (non-organized follow-up or NOFU), covering all information which is supplied spontaneously by cardiologists, general practitioners, family or others. All this information is evaluated by a doctor and is registered. The second line concerns the organized follow-up (OFU). This involves an annual follow-up directly to the patient by means of a written survey. Several endpoints were regis-
Table 1
Performed operations

<table>
<thead>
<tr>
<th>Operation</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolated CABG</td>
<td>740</td>
</tr>
<tr>
<td>Aortic valve surgery (+ CABG)</td>
<td>280</td>
</tr>
<tr>
<td>Mitral valve surgery (+ CABG)</td>
<td>96</td>
</tr>
<tr>
<td>Aortic and mitral valve surgery (+ CABG)</td>
<td>25</td>
</tr>
<tr>
<td>Other adult cardiac surgery</td>
<td>123</td>
</tr>
</tbody>
</table>

CABG, coronary artery bypass grafting; (+CABG), eventually in combination with coronary artery bypass surgery.

Table 2
Results at one year follow-up

<table>
<thead>
<tr>
<th></th>
<th>2003</th>
<th>2004</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients in follow-up</td>
<td>575</td>
<td>557</td>
<td>1132 (100)</td>
</tr>
<tr>
<td>Lost for follow-up</td>
<td>4</td>
<td>4</td>
<td>8 (0.7)</td>
</tr>
<tr>
<td>Refused further follow-up</td>
<td>3</td>
<td>3</td>
<td>6 (0.5)</td>
</tr>
<tr>
<td>Mortality</td>
<td>18</td>
<td>13</td>
<td>31 (2.7)</td>
</tr>
<tr>
<td>Cardiac related (OFU/NOFU)</td>
<td>6/3</td>
<td>6/3</td>
<td>12/6</td>
</tr>
<tr>
<td>Non-cardiac related (OFU/NOFU)</td>
<td>5/2</td>
<td>2/2</td>
<td>6/4</td>
</tr>
<tr>
<td>Unknown (OFU/NOFU)</td>
<td>2/0</td>
<td>2/0</td>
<td>2/0</td>
</tr>
</tbody>
</table>

OFU, organized follow-up; NOFU, non-organized follow-up.

4. Discussion

This study confirms our previous results [6]. First, a good response on the OFU, second, it seems possible for most of the deceased patients to distinguish cardiac- and non-cardiac-related mortality.

Although quality control of cardiac surgery includes much more than evaluating postoperative mortality, mortality remains an essential outcome parameter [7]. Hospital mortality is simple, easy to measure and to validate and registers all patients who die in the hospital independently of the postoperative period. However, there is the increasing number of higher risk patients and the shortening of postoperative hospital stay after cardiac surgery. More and more patients rapidly, frequently within the week, were discharged to their referring hospital, with the result that registration at the cardiac surgery center is generally stopped at that moment [4–6].

On the other hand, research shows that after hospital mortality deaths still occur [2–6], and that postoperatively we have an early, a constant and a late phase [2, 3]. During the ‘early phase’ mortality is related to procedures and care variables, but also to the risk profile of the patient. This ‘early phase’ runs up to approximately six months postoperative [2, 3]. So, when mortality is used as a parameter for quality of cardiac surgery it is based on these studies that the mortality of at least six months postoperative must be used and not in-hospital or even 30-day mortality [2–6].

The OFU had a very good response – in the first studies a completeness of 98% [5, 6]. Many patients also use the follow-up to bring up questions and problems, and a lot of them indicate to see this follow-up as a thoughtful interest in their health. This possibility of a personal input into the renewed set-up, the follow-up is frequently used and certainly a reason for the high response.

The importance of the OFU in this study is focused on mortality registration. Again previous studies are confirmed [2–6]. Hospital mortality gives an incomplete picture of the mortality. For this reason an active, structured follow-up is necessary. Approximately two-thirds of mortality within the first postoperative year is only detected by means of the OFU. An additional, but important point, is that this mortality can be subdivided into the cause, which is important if we use this mortality as a quality parameter for cardiac surgery, and is certainly more informative than the

terred: survival/mortality, heart function using the New York Heart Classification, quality of life, physical activity, but also events inculding wound problems, stroke, PCI, re-hospitalization, and others [6]. In the renewed set-up, there is explicitly the possibility to formulate questions and observations. Of course the possibility exists for the patient to stop further follow-up. When a patient has died, the family, who possibly receives this survey, is asked for the date of death and for additional information concerning how the patient died. Additionally, a letter is mailed to the family doctor also asking for information about the circumstances of the death of his patient. If none or insufficient information is presented to classify the cause of death, the patient’s cardiologist, or other doctors who recently attended to this patient are summoned. Eventually the family is contacted again by, for this follow-up, a responsible doctor. Globally we distinguish: cardiac-related; non-cardiac related; and unknown cause of death. But more detailed information, such as myocardial infarction, lung cancer is of course also registered.

Annually all patients receive their survey in the month following the month of their operation. When a patient does not answer within the month, a reminder is sent. If this reminder also remains without consequence, the patient is traced by means of his/her general practitioner, family, or the registry of births, deaths and marriages of the place of residence. When all this leads nowhere, the patient is classified as ‘lost for follow-up’.

This OFU is approved by the local ethical and research council and participation is on a voluntary basis. The OFU stops at the moment of death, at the moment the patient refuses further follow-up or when the patient is registered as ‘lost for follow-up’. The NOFU passes through in principle as long as information is supplied.

3. Results

Table 2 gives an overview of the completeness of the follow-up as well as of mortality registration, split up to show cause of death and follow-up-line that gives information concerning this mortality. The first follow-up year only eight patients (0.7%) were lost for follow-up. This means that follow-up was complete for more than 99%. Six patients (0.5%) indicated to refuse further follow-up. Thirty-one deceased patients were registered, of which 10 were registered by means of the NOFU and 21 by means of the OFU. Eighteen patients (58%) had a cardiac-related death. Two-thirds (12/18) of them were registered by means of the OFU, the others by means of the NOFU. Also for non-cardiac-related mortality most information came from the OFU.
mortality eventually furnished by a central register of births, deaths and marriages. For example, a patient in a good postoperative condition can die in a car accident, which of course has no relation with the quality of surgery. Despite the fact that on a scientific basis a follow-up six months postoperative already will give sufficient information [2–4], our OFU is organized one year postoperative. Because we register also quality of life and physical activity we fixed our follow-up moment at one year postoperative.

A discussion point is of course the workload of such structured follow-up. It is important that one now realizes that the workload for a follow-up organized at 30 days, 180 days or one year postoperative is equal. Judging this workload by the OFU is difficult because of several reasons. First, the CORRAD-follow-up does not include only the patients operated in the previous year, but already runs over different years. At this moment about 3500 patients per year are included in this follow-up. Second, not only mortality but also morbidity and data of a number of current research projects are registered. Third, a number of patients ask for an answer on the questions returned with their follow-up survey. Registering all these aspects, and certainly the morbidity data, is more intensive than simple mortality registration of the patients operated in the previous year. In the actual situation this OFU represents a workload of one day (8 h) per week for one person and this is inclusive of all mailing and input registration in the database. If the registration is only focused on mortality, we think this workload would decrease to about 3 h per week. Of course by performing our mailing in the last week of each month the work is concentrated in the following week; about 90% of the responses are returned within one week.

Although our report is focused on mortality registration, we must realize that event information is also important. We also register events with our OFU. A difficult point, though, is the validation of these events. If a patient indicates he/she had a new myocardial infarction, it could have been a period of unstable angina. A combination of our OFU and NOFU is therefore important. However, as already discussed in our previous paper, the NOFU is mostly limited to early discharge information, or information about the results of the rehabilitation program [6]. Refining this event registration is one of our points of interest at this moment, whereby the contribution of the cardiologist is essential.

We can conclude that a structured follow-up has a good response and provides important additional information concerning mortality, especially if we want to use mortality as a parameter in the quality control. Knowledge of this information confronted us with the incompleteness of the ‘hospital’ data and stimulated to perform this follow-up. We hope that by presenting our ‘limited’ experience others will realize the need of a structured follow-up and, additionally, that cardiologists realize that their information of late events is important for our evaluation.

Acknowledgments

We thank Mrs Petra Budde for her work in the secretarial function of the CORRAD database.

References