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Guidelines for Quality Improvement in Cardiac Surgery The College of Cardiac Surgery : Results of the 2007 Survey

J.-M. De Smet, Ph. Kolh**, Chr. Van Kerrebroeck***, G. Van Nooten***, F. Van Praet****, I. Rodrigus******

*C.U.B. Hôpital Erasme, Brussels ; **C.H.U. Sart Tilman, Liège ; ***A.Z. Z.O.L., Genk ; ****U.Z. Gent ; *****OLV Ziekenhuis, Aalst ; ******UZ Antwerpen, Edegem.

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Abstract. Optimal delivery of health care is a common goal of individual physicians, professional organizations, hospital structures and governmental authorities. A growing concern has emerged from the public, media and third payer organizations concerning the quality of care and the amount of resources spending. In the United States, large databases, guidelines and performance evaluation have been elaborated by medical societies, particularly in the area of cardiac surgery. These tools are useful for improvement of patients' care, resources distribution, pay for performance and public and practitioners' awareness.

The evaluation of quality is based on composite models combining structure, process and outcome indices. However, pitfalls such as patients' selection, and risk avoidance in order to improve results must been prevented by adjustment of the treated populations' risk factors by specific scores.

The Belgian Health authorities have built a structure directed at delivery of care improvement based on "Care Programs", monitored by Colleges formed by delegates of professional organizations. The College of Cardiac Surgery has promoted several studies aimed at data collection and evaluation. In 2007, a survey was addressed to all the Belgian Cardiac surgeons to define their opinion as to the best indicators of care in their specialty.

These results will serve to define further avenues of research. By maintaining the responsibility of care evaluation in the hands of the involved professionals, this kind of cooperation between governmental and physicians' organizations seems to serve the best interests of the public and the practitioners.

Introduction

The administrative and legal framework of evaluation of the quality of care in Belgium can be traced back to the "Law on the Hospitals", (Loi sur les Hôpitaux / Wet op de Ziekenhuizen) published on august 7, 1987, which has delineated fields of medical activity called "Care Programs". In order to improve the quality of medical delivery, the Care Programs were requested to evaluate their activity internally and externally. In 1999, the Medical Colleges were created by Royal Decree, each College corresponding to a Care program, and being in charge of monitoring "the qualitative evaluation of the medical activity within the hospitals".

The internal evaluation of the care programs is based on data registration and annual quality reporting within the hospitals, at the initiative of the Medical Chief. These results are to be transmitted to the competent Medical College.

The external evaluation is the core mission of the Colleges. It covers a wide field of subjects, including elaboration of quality indicators, database registration models, on-site visits, annual reports, evaluation of resource utilisation, and expert role in answering individual practitioners, medical services or authorities' questions.

The ultimate recipient of the Colleges' reports and advices is the "Multipartite Structure", created jointly by the Federal Public Service of Public Health, and the National Institute for Health and Disability Insurance (I.N.A.M.I. / R.I.Z.I.V.). The Multipartite Structure is composed of delegates of the Ministry, the Medical Colleges and experts in the field of Public Health and economy. It has an advisory function towards the Ministry of Public Health in matters related to medical practice, resources spending, hospital programs, fees of reimbursement, etc...

Further details on the structure and functioning of the Care Programs, the Medical Colleges and the Multipartite structure can be found on the website of the Belgian Association for Cardio Thoracic Surgery (B.A.C.T.S.) (www.bacts.org).

In the specific field of Cardiac Surgery, the Royal Decree of July 8, 2002 encloses a number of quality

indicators that established Cardiac Care Programs B3 (surgical treatment of acquired heart diseases) need to report annually to retain their recognition. Of note, the original list annexed to the legal text does not mention outcome variables.

The College of Cardiac Surgery

Originally, the College of Cardiac Pathology (Collège de Médecins pour le programme de soins «Pathologie Cardiaque»/ College van Geneesheren voor het zorgprogramma «Cardiale Pathologie») was composed of Cardiologists and Cardiac Surgeons, the latter being in minority. By a Ministerial Decree of June 30, 2004, two separate sections were formed in the College : a section of "non surgical cardiology" (eight members) and a section of "cardiac surgery" (six members). These two sections work separately, but should theoretically share secretarial resources and at some point emit common conclusions.

The members of the College of Cardiac Surgery are elected by the professional organization representing the Cardiothoracic Surgeons active in Belgium : the Belgian Association for Cardio-Thoracic Surgery (B.A.C.T.S.).

The College works in close cooperation with the Board of the B.A.C.T.S., and the different committees dealing with the data collection and quality control.

However, in order to maintain both the independence of the College, and the confidentiality of the collected data, all the communications with the subcommittees or the authorities must go through the Board of the B.A.C.T.S., and there is a declared incompatibility between College and data collection Committee membership.

During the past years, in order to comply with its mission, the College of Cardiac Surgery has issued annual reports based on the data collection operated by the B.A.C.T.S data committee :

it provides a complete analysis of the operations performed in all the cardiac surgery centres of the country.

Furthermore, the College performed focused inquiries on specific surgical procedures, such as atrial septal defect (A.S.D.) closure, and the use of mechanical assist devices.

The report entitled "Survey on the use of mechanical assist devices in Belgium 2002-2005" was released in January 2007 (Accessible on www.bacts.org).

The College of Cardiac Surgery 2007 survey

In addition to its annual data collection task, the College embarked in 2007 in a survey aimed at defining the best quality indicators in the practice of Cardiac Surgery, as seen by the actors on the field.

In a first step, the College outlined 25 parameters most frequently encountered in the literature, and thought appropriate to serve as indicators of surgical and institutional performance. The rationale and the choice of these indicators, as well as the current tendency of the literature in the field of quality control, will be discussed below.

These parameters were submitted to the cardiac surgeons, members of the B.A.C.T.S., who were requested to rank these criteria in decreasing order of importance. The questionnaires were sent electronically, and the answers could be provided by electronic or paper forms, both anonymously. The results will be presented and discussed below.

Quality measurement in adult cardiac surgery

Compared to other medical activities, cardiac surgery is a privileged domain for the evaluation of the quality of patient care.

Its relatively recent onset (after World War II), the centralization in large scale or academic hospitals, the large number of treated patients, standardized surgical procedures in well-defined fields, and easily identifiable outcomes explain this favourable context.

On the other hand, the amounts of resources involved, and the interest of the public and funding organisms, and of the media, have focused attention on its performances.

A growing concern for accountability and responsibility has prompted the profession, through its professional organizations, to initiate extensive clinical data collection and performance evaluation. Not surprisingly, the first structured initiatives came from the United States, where raising expenditures, lay public interest, and surgical results publication in the media made it imperative to coordinate quality measurement and information for the professionals and the public (1).

The U.S. Society of Thoracic Surgeons (S.T.S.) launched in 1987 a database that became a gold standard and a model for other disciplines. Recognizing that the keystone of accountability lies in the objective assessment of quality through performance measurement, the S.T.S. executive committee initiated in 2005 a comprehensive quality measurement program for cardiothoracic surgery (2).

The goals of this program were :

- to provide public accountability
- to facilitate quality improvement
- to satisfy the reporting requirements of pay for performance organisms

Basic principles of measure selection, definition of individual quality measures, statistical analysis, and the foundation of a methodology to obtain a composite score to characterize provider performance were published in 2007.

A practical example how quality improvement can be fostered on a national level by a professional medical society was provided by the adoption of two specific processes of care measures (beta-blockade therapy and internal mammary use in Coronary Artery Bypass Grafting) based on the STS and U.S. National Cardiac Database (4).

Also, a recent publication from the U.S. Carolinas Medical Centre has shown a 50% decrease in operative mortality after cardiac surgery after application of a quality improvement program (Q.I.P.) and use of standardized protocols (5). The use of quality measurement in pay-for-performance programs has been supported by the Congress of the U.S.A., the Medicare Payment Advisory Council, and the U.S. Institute of Medicine (6).

In Europe, a cumulative scoring index of risk evaluation (EuroSCORE) has been developed and is increasingly in use (7).

The Concept of Quality

Defining an abstract concept like "quality" is a difficult task, especially in the field of Health Care. Most authors agree on a combination of three different types of measures : structure, process and outcome (8).

Structure

Structural measures are defined as characteristics of the care provider generally thought to be associated with higher quality : for example, advanced radiologic or technical facilities, medical and nurse staffing, computerized databases, or a large volume of procedures (8).

It should be noted that the link between those items and quality can be difficult to asses : one of the most studied variable in this field is the volume/ outcome relationship. While it is evidently beneficial for complicated procedures, it becomes less evident for standardized operations such as coronary bypasses (9). The usefulness of structure measures in quality improvement is handicapped by the fact that they are often not actionable by care providers.

Process

Process measures reflect the extent to which a provider complies with evidence – based care guidelines. These guidelines are developed by professional organizations with the goal of decreasing practice variations and defining best-practice standards of care (2, 3).

They can be actionable by the care providers and are often used in pay-for-performance evaluation. One of the potentially adverse effects in this context is to focus the attention on a specific area while neglecting the others. Also, the compliance with a specific measure is sometimes difficult to measure, as contraindications or exclusions exist.

Outcomes

Results of a given procedure in terms of mortality, morbidity, complications, and global satisfaction of the patient's needs are the most obvious, intuitive and traditionally used parameters in evaluating medical care. However, collection of the data in a way specifically designed to evaluate these endpoints, as well as the risk-adjustment is necessary to avoid pitfalls in the use of these results. For instance, press and media publication of Hospitals' or physicians' crude mortality and morbidity figures can result in risk avoidance and selection of lower-risk patients only.

Selection of quality criteria by the College of Cardiac Surgery

After extensive review of the current literature, and based on the criteria published by the U.S. National Quality Forum and the S.T.S. Quality Measurement Task Force (2), the College of Cardiac Surgery selected 25 items, all related to the structure, process or outcome domains (Fig. 1).

This list of quality criteria was submitted by electronic mail to the cardiac surgeons, members of the B.A.C.T.S., which includes all the professionals of this specialty in Belgium.

They were asked to score the criteria from 1 (not at all important) to 5 (very important).

The answers were anonymous, and could be sent electronically, or by printing the questionnaire and sending it by mail.

A cumulative score was obtained by adding the figures for each item.

Results

The response rate was 60 out of 98 registered cardiac surgeons (response rate 61, 2%)

The results of the survey are presented in tables I and II.

The five highest scores are obtained by :

1. use of at least one arterial graft
2. surgical volume for valve surgery
3. participation in a systematic database including the use of EuroSCORE
4. common patient discussion with cardiologists
5. percentage of mitral repair of total valve surgery

The five lowest scores were :

21. programme for self-measurement of anticoagulation therapy
22. programme for minimal invasive surgery
23. programme for aortic valve repair

	Structure measures
1.	Surgical Volume for isolated CABG
2.	Surgical Volume for valve surgery
3.	Common patient discussion with cardiologists
4.	Regular Mortality and Morbidity conference
	Process measures
5.	The use of at least one arterial graft
6.	Program for minimal invasive surgery
7.	Protocol for control of postoperative infections
8.	Participation in a systematic database including the EuroScore
9.	Percentage of OPCAB cases of total CABG cases
10.	Percentage of mitral repair of total mitral valve surgery
11.	Patient prosthesis mismatch in AVR
12.	Program for aortic valve repair
13.	Use of mini-bypass system
14.	Definition, use and evaluation of clinical pathways
15.	Protocol for blood conservation measures
	Outcome measures
16.	Use of risk adjusted mortality plots (CRAM/CUSUM)
17.	Program for self-measurement of anticoagulation therapy
18.	Postoperative superficial and deep wound infection
19.	Number of revisions for bleeding
20.	Duration of post-operative intubation
21.	Number of per- and postoperative IABP use
22.	Postoperative stroke rate
23.	Postoperative renal insufficiency rate
24.	Postoperative length of stay in intensive care unit
25.	Total length of stay for cardiac surgery

Legends : CABG : Coronary Artery Bypass Graft, CRAM : Cumulative Risk Adjusted Mortality, CUSUM : Cumulative Sum, AVR : Aortic Valve Replacement, IABP : Intra Aortic Balloon Pulsation, OPCAB : Off Pump Coronary Artery Bypass.

Fig. 1
The BACTS Survey (score from 1 – not important to 5 – Very important)

24. percentage of Off Pump Coronary Bypass (OPCAB) of total Coronary Artery Bypass Graft (CABG) cases
25. use of mini-bypass system

Discussion and comments

This survey pursued three goals : to define the factors of quality considered the most important by professionals on the field, to provide substance for future inquiries and evaluations, and most importantly, to draw the attention of the cardiac surgeons on the fact that the definition and the accomplishment of the best quality of care still lies into their own hands.

This is possible through a close cooperation between the authorities in charge of the health care delivery in the country, and the professional organizations.

By no means was the survey intent to provide an evaluation of the importance of these criteria or to perform a statistical analysis based on the current scientific tendencies of the literature.

For instance, while it is desirable that mini- invasive procedures or complicated valve repairs should be explored and encouraged in a few selected centres, even if they are not highly scored in the survey, it is not surprising that a majority of heart surgeons rank at the first place well accepted items, such as arterial grafting, or common sense measures, like systematic database registration or collegial discussion with the cardiologists.

It should be mentioned that the situation in Belgium is peculiar in that the activity is disseminated in 28 cardiac centres in the country, most programs having a medium or small caseload. Hence, the "average" surgeon might favour familiar and well established procedures towards more experimental ones.

Future avenues of investigation could consist of exploring the way that the surgeons translate their selected criteria of quality into patients' benefit : for instance, where a majority agrees that use of arterial grafts is desirable, to what extent is it actually used in daily practice ?

On the other hand, exploring the lowest ranking items, some of them paradoxically being hot subjects in the

Table I

Cumulative score

1.	159	Use of at least one arterial graft	P
2.	154	Surgical Volume for Valve Surgery	S
3.	153	Participation in systematic D/B including EUROscore	P
4.	153	Common patient discussion with Cardiologists	S
5.	148	Percentage of mitral repair/total mitral valve surgery	P
6.	143	Surgical Volume for isolated CABG	S
7.	143	Protocol for blood conservation	P
8.	139	Regular M/M conference	S
9.	139	Protocol for control of P/O infections	P
10.	136	Use of risk adjusted mortality plots CRAM/CUSUM	O
11.	136	P/O superficial and deep wound infection	O
12.	135	Number of revisions for bleeding	O
13.	132	P/O stroke rate	O
14.	129	P/O renal insufficiency	O
15.	127	Duration of P/O intubation	O
16.	119	Definition, use and evaluation of clinical pathways	P
17.	112	Patient prosthesis mismatch in Ao valve surgery	P
18.	112	P/O length of stay in I.C.U.	O
19.	111	Total length of stay	O
20.	109	Rate of IABCP use	O
21.	107	Program for self measurement of A/C therapy	O
22.	103	Program for minimal invasive surgery	P
23.	97	Program for Aortic valve repair	P
24.	93	Percentage OPCAB cases of total CABG cases	P
25.	73	Use of mini bypass systems	P

Legends : S : Structure, P : Process, O : Outcome, CABG : Coronary Artery Bypass Graft, D/B : Data Base, M/M : Morbidity/Mortality, P/O : Post Operative, CRAM : Cumulative Risk Adjusted Mortality, CUSUM : Cumulative Sum, Ao : Aortic, I.C.U. : Intensive Care Unit, IABCP : Intra Aortic Balloon Counterpulsation, A/C : Anti Coagulants, OPCAB : Off Pump Coronary Artery Bypass.

scientific literature, could lead to a better understanding of the modalities by which such procedures are accepted or rejected by the professional community.

Current trends in quality measurement

Quality of care evaluation, as discussed earlier, is a difficult subject, and exposed to different approaches, either by professional organizations, governmental authorities, reimbursement and third-payer organisms, or privately funded initiatives.

Their goals can be diverging, and sometimes conflicting : while professional organizations will defend patients' interest through the delivery of better care, a secondary target will consist of maintaining physicians' independence and quality of practice, including financial fees for their services. In addition, as they often represent a majority of the involved professionals, they will tend to formulate the "average" practitioner's opinion, which could lead to some resistance towards fundamental changes.

Of note, professional societies that proudly maintain a large and permanently updated database are facing a major financial challenge : the costs of collection and updating are enormous, and could threaten these accomplishments in the long term.

On the other hand, depending on official funding is felt by some as putting their independence into jeopardy.

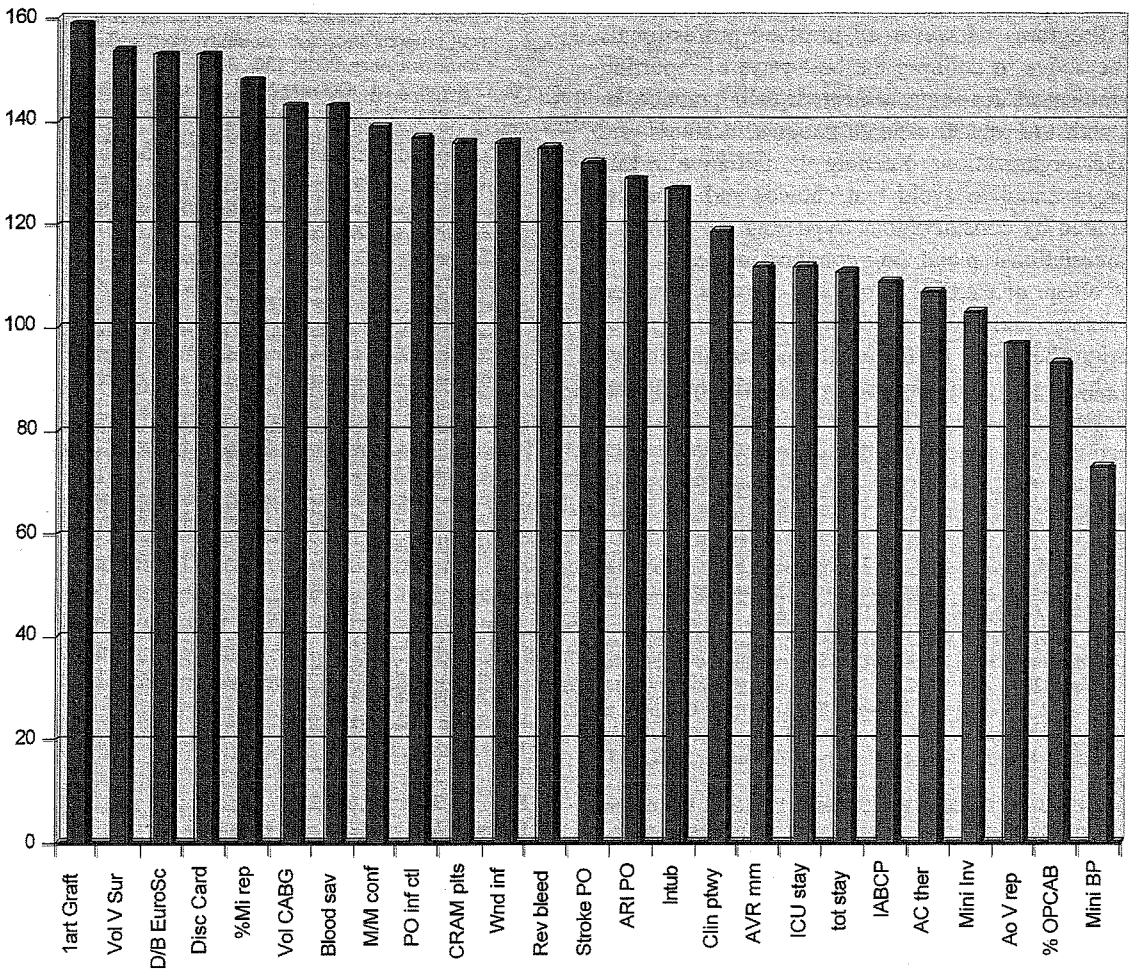
In the specific domain of Cardiovascular Surgery, the European Association for Cardio-Thoracic Surgery (E.A.C.T.S.), the European Society of Cardio-Thoracic Surgeons (E.S.T.S.) and the European Society for Cardio-Vascular Surgery (E.S.C.V.S.) agreed in 2003 to promote the European Cardiovascular and Thoracic Surgery Institute of Accreditation (E.C.T.S.I.A.) whose goal is to monitor and recognise good practice in cardiac, thoracic and vascular surgery (10). The adhesion is on a voluntary base (www.ectsia.org).

While this initiative may encounter obstacles due to financing and bias in results reporting due to its optional character, it is the best example of peer- recognition of quality, aiming at encouraging a culture of clinical performance monitoring.

Governmental and third-payer organizations have the same interest in patients' care, but are also concerned by resources management and allocation. Their policies are more dependent on global appreciation of all the aspects of public health management.

Privately funded initiatives from diverse origins, consumers' or industry' for instance, are of more recent onset, but take a growing part of the scene. Some concern can be expressed towards "hidden agendas", driven by

Table II



Legends : Art : arterial, Vol : volume, V : valve, Surg : surgery, Disc : discussion, Card : cardiologists, Mi : Mitral, rep : repair, sav : saving, CABG : Coronary Artery Bypass Graft, D/B : Data Base, MM : Morbidity/Mortality, PO : Post Operative, inf : infection, ctl : control, CRAM : Cumulative Risk Adjusted Mortality, plts : plots, Wnd : Wound, Rev : Revision, bleed : bleeding, ARI : Acute Renal Insufficiency, Intub : Intubation, Clin : Clinical, ptwy : pathways, mm : mismatch, AVR : Aortic Valve Replacement, I.C.U. : Intensive Care Unit, tot : total, IABCP : Intra Aortic Balloon Counterpulsation, AC : Anti Coagulants, ther : therapy, inv : invasive, Ao : Aortic, V : valve, rep : repair, OPCAB : Off Pump Coronary Artery Bypass, BP : Bypass.

different tendencies in the global philosophy of health care delivery. Examples can be found in forums such as the Leapfrog Group (a U.S. consortium of Fortune 500 companies, large private and public health care purchasers, founded by The Business Roundtable). (www.leapfroggroup.org).

Another more recent example is the Brussels-based "Health Consumer Powerhouse", who released a document entitled "Euro Consumer Heart Index 2008 Report", scoring the delivery of cardiologic health services in the European Union countries, based on criteria such as accessibility, prevention, but also populations' opinion on quality of health care. This initiative is funded by an unrestricted grant from Pfizer Inc. (www.healthpowerhouse.org).

The approach is interesting, but raises several questions and concerns, such as the statement that hospitals' and physicians' results should be readily available to the public. We have seen that risk-adjustment is essential to avoid institutions or doctors turning down high risk patients in order to improve their statistics.

Data gathering is said to have been done through *"...contact with the Ministries of Health...national agencies ... cardiovascular experts and their respective professional organizations..."* (11), which leaves the involved professionals a little sceptical.

Conclusions

Quality monitoring in the practice of medicine, and especially in the field of Cardiovascular Surgery, is a complex

and sensitive subject. Some quality indicators are already requested by law in order to maintain official recognition of Care Programs. However all involved professionals should be active in defining the best ways of reporting quality indicators for improvement of their practice, in concert with the related official, patients, business and third-payer organizations. Keeping the initiative in this regard is essential to avoid that choices and conducts been dictated by considerations bypassing the patient – physician relationship and their common interests.

The College of Cardiac Surgery is actively involved in this matter, and seems to offer a good example of cooperation between professional and administrative experts sharing a common concern for the quality of health delivery.

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J.-M. De Smet, M.D.
Service of Cardiac Surgery
C.U.B. Hopital Erasme
808 Route de Lennik
1070 Brussels, Belgium
Tel. : 32.2. 555.38.17
Fax : 32.2. 555.66.52
E-mail : Jean-marie.de.smet@ulb.ac.be