



Ministero della Salute
 Direzione Generale della Ricerca Sanitaria
 e Biomedica e della Vigilanza sugli Enti
 BANDO 2013 PROGETTI DI RICERCA
 PROGETTO COMPLETO

Project Title: The PRIORITY Study - PRedicting long term Outcomes afteR Isolated coronary arTery bypass surgerY	
Project Code: GR-2013-02359264	Principal Investigator: BARILI FABIO
Research Type: Clinical health care research/Clinico-assistenziale	Applicant Institution: Piemonte

Project Type: Young Researcher (under 40 years)/Giovani Ricercatori

New strategies for diagnostic, therapeutic and clinical care in Metabolic and cardiovascular diseases

Project Classification IRG: Healthcare Delivery and Methodologies

Project Classification SS: Health Services Organization and Delivery - HSOD

Project Keyword 1: Healthcare quality, effectiveness, and outcomes; clinical practice guidelines; treatment and prevention outcomes; patient and provider satisfaction; health status and outcomes assessment; evidence-based practice; health-related quality of life; medical decision-making.

Project Keyword 2: Coronary Artery Bypass Graft (CABG)

Project Keyword 3: Long term outcomes

Project Request: Animals: Humans: Clinical trial:

The project has already been presented: Project code reference:

I declare that the object/s of this application is under patent copyright

Overall Summary

The allocation of clinical and economic resources is an emerging issue in health management. A useful update necessarily depends on evaluation of long-term outcomes of clinical and surgical resources that can permit emphasis on all amendable fields, improve quality of care, and reduce health costs. The PRIORITY Study represents the first innovative step toward the updating of health management in a selected field, surgery for coronary artery disease, which is one of the most prevalent diseases and requires allocation of high-cost resources, although information on long-term outcomes is limited. The aims of this study are the identification of pre-operative risk factors for long-term outcomes and the development of clinical and administrative pre-operative scores that can lead clinicians and the NHS to more appropriate actions for increasing quality of care and reducing costs.

Background / State of Art

Coronary heart disease (CHD) is one of major diseases worldwide. A 16% increase in its prevalence is expected within the next 20 years, with a devastating impact in terms of clinical aspects and allocation of resources. Coronary artery bypass grafting (CABG) is the most effective treatment for CHD. More than 22000 CABG are performed yearly in Italy. CABG provides the best perioperative results, but little information is available on long-term mortality and morbidity. A large part of economic resources are constantly diverted to funding healthcare, mainly due to the increasing burden of chronic diseases, such as CHD. Policy proposals and demonstration projects are exploring ways to improve care and reduce costs. Predicting perioperative mortality is no longer considered adequate nor sufficient for quality assessment, thus higher attention is being focused on more specific qualitative and economical parameters, such as long-term mortality/morbidity and re-hospitalization rates, which have become important measures of both quality and costs.



Project Title: The PRIORITY Study - PRedicting long term Outcomes after Isolated coronary arTery bypass surgery	
Project Code: GR-2013-02359264	Principal Investigator: BARILI FABIO
Research Type: Clinical health care research/Clinico-assistenziale	Applicant Institution: Piemonte
Project Type: Young Researcher (under 40 years)/Giovani Ricercatori	

Hyphotesis and Specific AIMS

Hyphotesis and Significance:

Individual preoperative characteristics can predict long-term outcomes in patients treated with CABG. Data from literature report that individual preoperative characteristics predicting 30-day mortality after isolated CABG surgery are also significant predictors of long-term outcomes. The Italian CABG Project collected data on 34,310 isolated CABGs providing a short-term risk function. We hypothesize that preoperative clinical data collected in the Italian CABG study can be employed to build a new risk score able to predict outcomes at up to 10-year, specific for the Italian population and also tailored on specific subgroups of patients and surgical options.

Literature shows that a previous history of AMI, stroke, diabetes, renal failure, etc. can predict re-hospitalization 2-year after CABG surgery. Hospital Discharge Records (HDR) routinely collected by the Italian NHS provide information on patients comorbidities which are useful to trace patients' previous clinical history. Our hypothesis is that information from administrative data, supplemented by some preoperative data, if needed, can be used to develop a risk function to predict mid- and long-term re-hospitalization and health-related costs of patients treated with isolated CABG surgery.

Specific Aim:

- Aim 1: To create a risk score to predict mid- and long-term outcomes after isolated CABG surgery based on patients' preoperative clinical characteristics and surgical procedure options.
- Aim 2: To build a risk function predicting mid- and long-term re-hospitalization of patients treated with isolated CABG surgery using administrative data properly supplemented by few selected patients' preoperative clinical characteristics.
- Aim 3: To analyze costs related to the long-term management of patients treated with CABG, considering patients' preoperative characteristics and surgical procedure options.

Experimental Design Aim 1:

Prospective multicenter cohort study

The IT-CABG cohort includes all patients enrolled in the Italian CABG Project (2002-04) and the Italian CABG-2 Project (2007-08), who underwent an isolated CABG intervention (IT-CABG cohort). The IT-CABG database is the data source for patients' demographic and pre-operative clinical characteristics. The internally linked National HDR database, further linked with the Tax Register (TR) Information System, will be the source of data on patients' follow-up (HDR-TR database). Our well-established expertise in methodologies of record-linkage between clinical and administrative data (Rosato, 2008; D'Errigo, 2011) will allow us to develop and implement the right procedures to link the IT-CABG and HDR-TR databases (PRIORITY database). These data will be used to build a risk score able to predict mortality/MACCE at up to 10-year of follow-up after CABG interventions. The score will be specific for the Italian population. An on-line score calculator will also be implemented in a dedicated website.

This is the first large Italian prospective study aimed at carrying out a record linkage between clinical, administrative, and mortality data at a national level. It is also the first attempt to create a risk score predicting long-term outcomes after CABG interventions in the Italian population.

Experimental Design Aim 2:

Retrospective cohort study

The HDR-TR database will be linked with the IT-CABG database. The cohort will include all HDR with ICD9-CM 36.1 (CABG intervention), linked with the IT-CABG records (PRIORITY database).

The HDR-TR database will be the data source for both pre-operative conditions (previous hospitalizations, comorbidities, and other interventions) and follow-up information for each patient included in the cohort. These administrative data will be



Ministero della Salute
 Direzione Generale della Ricerca Sanitaria
 e Biomedica e della Vigilanza sugli Enti
 BANDO 2013 PROGETTI DI RICERCA
 PROGETTO COMPLETO

Project Title: The PRIORITY Study - PRedicting long term Outcomes after Isolated coronary artery bypass surgery	
Project Code: GR-2013-02359264	Principal Investigator: BARILI FABIO
Research Type: Clinical health care research/Clinico-assistenziale	Applicant Institution: Piemonte
Project Type: Young Researcher (under 40 years)/Giovani Ricercatori	

used to estimate a risk function predicting recurrent re-hospitalizations within 1, 2, and 3 years after CABG. Clinical pre-operative information from the IT-CABG database will be used to validate results obtained from administrative data and as a source of additional clinical variables to improve the risk function prediction. An on-line calculator estimating the expected re-hospitalizations and total length of stay for different subgroups of patients will be also implemented in a dedicated website. This will be the first attempt to assess post-intervention outcomes in terms of recurrent re-hospitalization. It will provide the NHS with a valid tool for the routine identification of specific patients who will need, more than others, hospital-based care for up to 3 years after CABG.

Experimental Design Aim 3:

To provide an estimate of the follow-up cost due to hospitalization. The HDR-TR database will work as data source for information on re-hospitalizations for each patient included in the PRIORITY study. The cost of each hospital readmission will be calculated using regional DRGs fees (euros) as refunded to hospitals by the Regional National Health Systems (NHS). Costs will be updated as for 2014 using the Consumer Price Index. Demographic and clinical characteristics reported in the PRIORITY database (IT-CABG+HDR-TR) will be used to predict the cumulative cost for all patients within 1, 2, and 3 years of follow-up. Ours will be the first attempt to assess post-intervention outcomes in terms of costs related to recurrent re-hospitalizations. This will provide the NHS with a valid tool to identify subgroups of patients who will need additional resources at up to 3 years of follow-up after CABG, thus allowing an adequate allocation of funds and a proper organization of health services.

Preliminary Data:

The Italian CABG and CABG-2 Projects collected clinical data on all adults who underwent an isolated CABG intervention in Italian cardiac surgery centers (N=41,746). The linkage between a subset of these data and all regional HDR databases was about 95%. The Italian CABG Project developed a risk function to predict 30-day mortality which fits Italian data way better than other American and European pre-set risk scores. Our data show a 4.8% and 8.9% mortality rates at 1 and 3 years respectively, different from the 6.2% and 11.2% rates at the same intervals in US population. In a previous study we found that information from the National HDR database is accurate in reporting patients' clinical history. Our data show that about 31% of patients are re-hospitalized at least once within the first year, the average total LOS is 13.4 days, and about 20% of patients has a LOS >=20 days. A preliminary analysis showed that the use of off-pump circulation significantly reduces long-term re-hospitalization for percutaneous coronary intervention, with the subsequent reduction of costs due to hospitalization and adjunctive treatments.

Picture to support preliminary data:

Methodologies and statistical analyses:

DATA SOURCE: The IT-CABG database (n=41,746) is the data source for patients' demographic and pre-operative clinical characteristics. The HDR database collects demographic characteristics, diagnoses, and procedures for each hospitalized patient. The internal linkage in the HDR database connects all records concerning different hospitalizations for the same patient and allows to trace each patient's clinical history in terms of diseases, re-hospitalizations, and interventions. The TR Information System systematically gathers relevant personal data for tax purposes. Information on life status of



Project Title: The PRIORITY Study - PRedicting long term Outcomes after Isolated coronary artery bypass surgery	
Project Code: GR-2013-02359264	Principal Investigator: BARILI FABIO
Research Type: Clinical health care research/Clinico-assistenziale	Applicant Institution: Piemonte
Project Type: Young Researcher (under 40 years)/Giovani Ricercatori	

residents in Italy is updated on a regular basis.

The internally linked HDR database, further linked with the TR Information System, will be used as data source for information on pre-operative admissions and follow-up (HDR-TR database). The IT-CABG database will be linked with the HDR-TR database (PRIORITY database). Several consecutive steps will be carried out, considering different combinations of linkage-keys, to provide the maximum number of linked records.

ENDPOINTS: All-cause mortality and MACCE within 1-3-5-10 years from the intervention; readmissions for all causes and for cardiac events within 1-2-3 years.

STATISTICAL ANALYSES: The individual risk of adverse outcomes (death, MACCE, readmissions) will be estimated using the multivariate Cox proportional hazard model (CoxPH model) together with fully parametric time-to-event analysis (mainly accelerated failure time models), implemented with a further evaluation of competing risks (Barili, 2012).

Factors associated with time-to-re-hospitalization will be assessed using a generalization of the CoxPH model for recurrent event data (frailty model and Andersen-Gill method). A cross-validation approach with a stepwise selection of explicative variables will be carried out for all of the proposed models.

In particular, the enrolled cohort will be randomly split into two samples. Sample I will be used to develop the predictive model, and sample II to validate it. A stepwise procedure will be implemented to identify the patients' characteristics to be included in the predictive model. The entire data set will be eventually used to estimate the final coefficients and calculate P values. A set of interaction hypotheses defined a priori will be tested. The suitable statistical tests will be used to assess the adaptability of the model in terms of calibration and discrimination. A multilevel approach will be also tested to account for the 'non-random' allocation of patients in different hospitals. This approach has been successfully used in a previous IT-CABG database analysis.

Administrative variables from the HDR-TR database will be used to develop models to predict re-hospitalizations. Clinical parameters from the IT-CABG database will be used as the only explicative variables in models predicting death and MACCE. They will also be used to validate results from administrative data and as additional information to improve the risk function predicting re-hospitalizations.

The estimate of re-hospitalization costs will be carried out accounting for potential censored data in each patient's follow-up. The mean cumulative cost within 1-2-3 years of follow-up will be estimated using the inverse probability weighting (IPW) estimator proposed by Bang and Tsiatis (2000). The censoring distribution will be estimated using the Kaplan-Meier estimator.

The method proposed by Lin (2000), that accounts for censored medical costs, will be adopted in the analysis of cost predictors, to prevent biases due to incomplete follow-up costs in the regression parameter estimates. Thus, factors associated with cumulative costs will be assessed using general linear models (GLMs) and based on the survivor function for being censored during the follow-up.

Expected outcomes:

The main expected outcome is the identification of risk factors that affecting both long-term clinical outcomes and re-hospitalizations. This will allow the development of complementary (clinical and administrative) risk scores able to predict patients' outcomes after isolated CABG and health-related costs. The primary intermediate expected outcome is an adequate linkage between the IT-CABG database and the HDR-TR database, to guarantee reliable results. The expected amount of linked data from IT-CABG records should reach at least 95% based on some of our preliminary attempts using different combinations of linkage-keys. The secondary intermediate expected outcome is the ability of patients' pre-operative clinical characteristics, gathered to predict short term mortality after CABG, to predict also long term outcomes. Once reached all the cited expected outcomes, a further and innovative expected outcome will be the definition of a score calculator for clinical outcomes (death and MACCE), re-hospitalizations and costs.

Risk analysis, possible problems and solutions:



Project Title: The PRIORITY Study - PRredicting long term Outcomes after Isolated coronary artery bypass surgery	
Project Code: GR-2013-02359264	Principal Investigator: BARILI FABIO
Research Type: Clinical health care research/Clinico-assistenziale	Applicant Institution: Piemonte

Project Type: Young Researcher (under 40 years)/Giovani Ricercatori

An adequate linkage between the IT-CABG and the HDR-TR databases is expected to define a risk function predicting long term outcomes. A high percentage (at least 95%) of linkage will be needed to obtain reliable and unbiased results. A semi-deterministic strategy will be pursued, if such percentage is not reached, following a progressive widening of matching criteria. The linked records will be checked singularly to avoid a possible over-linkage due to this unspecific strategy. However, a sensitivity analysis of linked vs unlinked IT-CABG records will be performed to exclude any linkage-related bias. The risk functions used to develop the score calculator will be based, for the prediction of clinical outcomes (death and MACCE), on patients' pre-operative clinical characteristics originally gathered to predict short term mortality after CABG. As risk factors used to predict short term outcomes would not allow proper estimation of long-term outcomes, we plan to improve the predictive ability of the risk function by adding information about chronic diseases taken from the HDR-TR database.

Administrative variables from the HDR-TR database will also be used to develop risk functions for re-hospitalizations and costs. Algorithms based on administrative data are reported to have a poor performance when developed for health care purposes, therefore, we plan to implement the administrative score used to estimate re-hospitalizations and costs, but adding a second step for clinical parameters that can possibly improve its discriminative ability and calibration. Moreover, if the role of specific variables as effect modifiers is confirmed, risk scores will be developed stratifying by effect modifier categories (i.e. by gender or age classes).

Cost estimations analyses based on traditional methods (e.g. simple arithmetic averages of costs) are known to be biased in case of incomplete follow-up. The mean cumulative cost within 1, 2, and 3 years will be estimated using the inverse probability weighting (IPW) estimator proposed by Bang and Tsiatis (2000) to overcome this issue. Cost data are generally positively skewed, thus, factors influencing re-hospitalization costs will be investigated assessing alternative specifications in the GLMs, such as gamma distribution and logarithmic link function.

Significance and Innovation

This study will provide two new scores (clinical and administrative) to predict of mid-/long-term outcomes after isolated CABG. The web-based, user-friendly, on-line score calculator will allow clinicians and the NHS to adopt measures to improve outcomes. Clinicians will be able to identify subjects with potentially complicated post-operative courses, and to improve the risk profile before surgery. They will also have a new tool to estimate potential contraindications to surgery. The NHS will be able to use these tools to allocate resources, as they allow to calculate the pre-operative risk of re-hospitalization and related costs for each patient, and thus select subgroups of patients with potential adjunctive needs of post-intervention care. Moreover, these tools create a basis for quality assessment and for a program of quality improvement, as they allow the identification of patients with an expected uneventful course, who then show complications and require re-hospitalization.

Description of the complementary and synergy research team

A cardiac surgeon (PI) well experienced in score modeling and in project coordination will guarantee the achievement of all the expected goals of the proposal. Two cardiac surgeons well experienced in clinical/methodological issues will guarantee the appropriate clinical interpretation of the findings, and will contribute to the dissemination of results. An epidemiologist with experience in screening of scientific publications, data management and drafting of scientific papers will guarantee the application of the appropriate methodologies and the critical interpretation of results. A statistician experienced in evaluative research, and three statisticians experienced in record-linkage procedures and data analysis of clinical and administrative data will guarantee the achievement of all expected outcomes. Two epidemiologists well experienced in comparative effectiveness assessment will supervise all phases of the study. A qualified technician will support technical activities.



Project Title: The PRIORITY Study - PRedicting long term Outcomes after Isolated coronary arTery bypass surgery	
Project Code: GR-2013-02359264	Principal Investigator: BARILI FABIO
Research Type: Clinical health care research/Clinico-assistenziale	Applicant Institution: Piemonte
Project Type: Young Researcher (under 40 years)/Giovani Ricercatori	

Bibliography

- ANDERSEN P- Cox's regression model for counting processes: a large sample study. Ann Stat 1982;10(4):1100
 BANG H- Estimating medical costs with censored data. Biometrika 2000; 87:329-43.
 BARILI F - An original model to predict Intensive Care Unit length-of stay after cardiac surgery in a competing risk framework. Int J Cardiol 2012;EPub
 D'ERRIGO P - Use of hierarchical models to evaluate performance of cardiac surgery centres in the Italian CABG outcome study. BMC Med Res Methodol 2007;7:29
 D'ERRIGO P - Comparison between an empirically derived model and the EuroSCORE system... Eur J Cardiothorac Surg 2008;33:325
 HERLITZ J - Predictors of hospital readmission two years after CABG. Heart 1997;77:437
 LIN D - Linear regression analysis of censored medical costs. Biostatistics 2000;1:35
 MACKENZIE TA - Prediction of survival after coronary revascularization: modeling short-term, mid-term, and long-term survival. Ann Thorac Surg 2009;87:463
 MCGILCHRIST CA - Regression with frailty in survival analysis. Biometrics 1991;47:461
 ROSATO S - Confronto tra l'uso di sistemi informativi correnti e database clinici nella valutazione delle prestazioni cardiocirurgiche. Giorn Ital Cardiol 2008;9:569
 SECCARECCIA F - The 'Italian CABG Outcome Study'. Eur J Cardiothorac Surg 2006;29:56
 SECCARECCIA F -Lo studio Mattone Outcome BYPASS... Giorn Ital Cardiol 2011;12:439-49
 WU C - Risk Score for Predicting Long-Term Mortality After CABG. Circulation 2012;125:2423

Timeline / Deliverables / Payable Milestones

0-18 months. Review of the scientific literature on long-term outcomes after CABG and long-term risk score. Writing of both the clinical and the operative sections of the PRIORITY study protocol. Acquisition of the HDR-TR database. Record linkage procedures. Quality analysis of the PRIORITY database. Development of the web-site. Two meetings of the research team.

19-30 months. Statistical analyses. Critical discussion of results and writing of a scientific report. Updating of the website with all produced documents. Development and testing of the on-line risk calculators. Two meetings of the research team on the final results.

31-36 months. Implementation and presentation of the on-line risk-score calculator to NHS operators. Dissemination of all project results through a conclusive meeting. Writing and submission of the final report for scientific publication.

Milestones 18 month

1. All the operative protocols available
2. The PRIORITY database ready to be analyzed

Milestones 36 month

1. The on-line risk calculators available
2. A final project report drawn up

Gantt chart

gant chart_DEF.xlsx



Ministero della Salute
Direzione Generale della Ricerca Sanitaria
e Biomedica e della Vigilanza sugli Enti
BANDO 2013 PROGETTI DI RICERCA
PROGETTO COMPLETO

Project Title: The PRIORITY Study - PRedicting long term Outcomes after Isolated coronary arTery bypass surgery	
Project Code: GR-2013-02359264	Principal Investigator: BARILI FABIO
Research Type: Clinical health care research/Clinico-assistenziale	Applicant Institution: Piemonte
Project Type: Young Researcher (under 40 years)/Giovani Ricercatori	

Equipment and resources available

Piemonte- Coordinating Center (U1): For the fulfillment of all project activities, three PCs, two printers, and a fax and a share of consumables and supplies will be put at project disposal. SAS statistical packages will be used for data analysis.

Istituto Superiore di Sanità (U2): four PCs, two printers, a fax, and a share of consumables and supplies will be put at project disposal. A dedicated portion of a local server for the storage of the different databases will be created. The SAS and STATA statistical packages will be used for data analysis and record linkage procedures.

AO Città della Salute e della Scienza, Torino (U3): Two PCs, a printer, and a fax will be put at project disposal. A dedicated portion of a local server for the storage of data will be created. The SAS statistical packages will be used for medical cost analysis.

Finally, a PC, printer, and fax will be put at project disposal by the Lazio Regional Health Service; a dedicated portion of a local server for the storage of data will be created and put at project disposal; as human resources, a statistician will be involved in the study to perform reliable record-linkage between the available databases. SAS statistical packages will be used for data analysis.

Translational relevance and impact for the National Health System (SSN)

The new risk score predicting long-term outcomes after CABG, like other available scores for short-term mortality, can become a valid tool to support clinicians in choosing therapeutic strategies for CHD management.

The risk function predicting re-hospitalization after CABG surgery can be used by regional and national health authorities to identify subgroups of patients at higher risk of recurrent readmissions, to plan prevention priorities, and to optimize the allocation of resources. Moreover, it will provide policy makers with a greater understanding of the characteristics of re-hospitalized patients and the risk factors contributing to re-hospitalization due to frequently occurring medical conditions.

A risk function based only on administrative data will provide the NHS with a valid tool for the routine identification of specific patients who will need, more than others, hospital-based care and additional resources after isolated CABG.



Project Title:
 The PRIORITY Study - PRedicting long term Outcomes after Isolated coronary artery bypass surgery

Project Code: GR-2013-02359264

Principal Investigator: BARILI FABIO

Research Type: Clinical health care research/Clinico-assistenziale

Applicant Institution: Piemonte

Project Type: Young Researcher (under 40 years)/Giovani Ricercatori

Proposed total budget (Euro)

Costs	Budget Year 1	Budget Year 2	Budget Year 3	TOTAL BUDGET	Co-Funding	List of costs proposed for funding to the moh
1 Staff salary	170.000,00	150.000,00	170.000,00	490.000,00	490.000,00	
2 Researchers contracts	38.000,00	76.000,00	19.000,00	133.000,00	0,00	133.000,00
3a Equipment (leasing)	9.900,00	5.300,00	5.300,00	20.500,00	0,00	20.500,00
3b Supplies	5.400,00	5.000,00	4.000,00	14.400,00	0,00	14.400,00
3c Model costs	0,00	0,00	0,00	0,00	0,00	0,00
4 Subcontracts	0,00	0,00	0,00	0,00	0,00	0,00
5 Patient costs	0,00	0,00	0,00	0,00	0,00	0,00
6 IT services and data bases	18.000,00	13.000,00	8.000,00	39.000,00	0,00	39.000,00
7 Travels	1.000,00	2.000,00	2.000,00	5.000,00	0,00	5.000,00
8 Publication costs	0,00	1.300,00	1.300,00	2.600,00	0,00	2.600,00
9 Overheads	26.500,00	0,00	0,00	26.500,00	0,00	26.500,00
10 Coordination costs	5.000,00	10.000,00	10.000,00	25.000,00	0,00	25.000,00
Total	273.800,00	262.600,00	219.600,00	756.000,00	490.000,00	266.000,00

Report the Co-Funding Contributor:

The S. Croce Hospital - Department of Cardiac Surgery, the Istituto Superiore di Sanità, and the AO Città della Salute e della Scienza di Torino - Unità di Epidemiologia Clinica e Valutativa will be the co-funding contributors through the salary of the respective permanent staff involved into the project.

In particular, the S. Croce Hospital - Department of Cardiac Surgery will contribute with 250 h/year of a senior cardiac surgeon, Head of the Cardiac Surgery Department and 700 h/year each, of two young cardiac surgeons; the Istituto Superiore di Sanità will contribute with 500 h/year of a senior epidemiologist researcher, 300 h/year each, of two young statistician researchers and 350 h/year of an administrative technician; the AO Città della Salute e della Scienza di Torino - Unità di Epidemiologia Clinica e Valutativa will contribute with 300 h/year of a senior epidemiologist researcher and 450 h/year of a young statistician researcher.



Project Title:
 The PRIORITY Study - PRedicting long term Outcomes after Isolated coronary arTery bypass
 surgerY

Project Code: GR-2013-02359264

Principal Investigator: BARILI FABIO

Research Type: Clinical health care research/Clinico-
 assistenziale

Applicant Institution: Piemonte

Project Type: Young Researcher (under 40 years)/Giovani Ricercatori

Budget Justification

1 Staff salary	A senior cardiac surgeon (250h/year); two young cardiac surgeons (700h/year each); two senior epidemiologists (500h/year and 300h/year); two young statisticians (300h/year each); a young statistician (450h/year); an administrative technician (350h/year)
2 Researchers contracts	A one year research contract for Unit 3 activities and one 2 two years and 6 months research contract for Unit 2 activities.
3a Equipment (leasing)	Costs to create and maintain portions of local servers for the data storage (Unit 3). Two PCs and a printer through a leasing contract for three years (Unit 1-3).
3b Supplies	Toners; paper; pen-drives, CDs and DVDs for data storages; other consumables and supplies useful for the project activities (Unit 1-3).
3c Model costs	none
4 Subcontracts	none
5 Patient costs	none
6 IT services and data bases	Two 3 years SAS statistical package licenses (Unit 2-3).. Set up, development and maintenance of a dedicated Web-site (Unit 2); costs to create and maintain portions of local servers for the data storage (Unit 3).
7 Travels	Travels costs for the participation to meetings and congresses (Unit 1 and 2).
8 Publication costs	Costs for dissemination of results through scientific publication and participation to national and international congresses (subscription fees) (Unit 2)
9 Overheads	General indirect costs
10 Coordination costs	Costs for the organization of working group meetings, conference calls and final congress (CME, conference room, catering, etc..) (Unit 1)



Project Title:
 The PRIORITY Study - PRedicting long term Outcomes after Isolated coronary arTery bypass
 surgerY

Project Code: GR-2013-02359264

Principal Investigator: BARILI FABIO

Research Type: Clinical health care research/Clinico-
 assistenziale

Applicant Institution: Piemonte

Project Type: Young Researcher (under 40 years)/Giovani Ricercatori

Proposed total budget UO1 Institution: Piemonte (Euro)

Costs	Budget Year 1	Budget Year 2	Budget Year 3	TOTAL BUDGET	Co-Funding	List of costs proposed for funding to the moh
1 Staff salary	80.000,00	80.000,00	80.000,00	240.000,00	240.000,00	
2 Researchers contracts	0,00	0,00	0,00	0,00	0,00	0,00
3a Equipment (leasing)	1.500,00	1.500,00	1.500,00	4.500,00	0,00	4.500,00
3b Supplies	2.400,00	2.000,00	1.600,00	6.000,00	0,00	6.000,00
3c Model costs	0,00	0,00	0,00	0,00	0,00	0,00
4 Subcontracts	0,00	0,00	0,00	0,00	0,00	0,00
5 Patient costs	0,00	0,00	0,00	0,00	0,00	0,00
6 IT services and data bases	0,00	0,00	0,00	0,00	0,00	0,00
7 Travels	0,00	1.000,00	1.000,00	2.000,00	0,00	2.000,00
8 Publication costs	0,00	0,00	0,00	0,00	0,00	0,00
9 Overheads	4.100,00	0,00	0,00	4.100,00	0,00	4.100,00
10 Coordination costs	5.000,00	10.000,00	10.000,00	25.000,00	0,00	25.000,00
Total	93.000,00	94.500,00	94.100,00	281.600,00	240.000,00	41.600,00

Report the Co-Funding Contributor:

Proposed total budget UO2 Institution: Istituto Superiore di Sanità (Euro)

Costs	Budget Year 1	Budget Year 2	Budget Year 3	TOTAL BUDGET	Co-Funding	List of costs proposed for funding to the moh
1 Staff salary	60.000,00	40.000,00	60.000,00	160.000,00	160.000,00	
2 Researchers contracts	38.000,00	38.000,00	19.000,00	95.000,00	0,00	95.000,00
3a Equipment (leasing)	1.500,00	1.500,00	1.500,00	4.500,00	0,00	4.500,00
3b Supplies	2.000,00	2.000,00	1.400,00	5.400,00	0,00	5.400,00
3c Model costs	0,00	0,00	0,00	0,00	0,00	0,00
4 Subcontracts	0,00	0,00	0,00	0,00	0,00	0,00
5 Patient costs	0,00	0,00	0,00	0,00	0,00	0,00
6 IT services and data bases	16.500,00	11.500,00	6.500,00	34.500,00	0,00	34.500,00



Project Title:
 The PRIORITY Study - PRedicting long term Outcomes after Isolated coronary arTery bypass
 surgerY

Project Code: GR-2013-02359264

Principal Investigator: BARILI FABIO

Research Type: Clinical health care research/Clinico-
 assistenziale

Applicant Institution: Piemonte

Project Type: Young Researcher (under 40 years)/Giovani Ricercatori

Costs	Budget Year 1	Budget Year 2	Budget Year 3	TOTAL BUDGET	Co-Funding	List of costs proposed for funding to the moh
7 Travels	1.000,00	1.000,00	1.000,00	3.000,00	0,00	3.000,00
8 Publication costs	0,00	1.300,00	1.300,00	2.600,00	0,00	2.600,00
9 Overheads	16.100,00	0,00	0,00	16.100,00	0,00	16.100,00
10 Coordination costs	0,00	0,00	0,00		0,00	
Total	135.100,00	95.300,00	90.700,00	321.100,00	160.000,00	161.100,00

Report the Co-Funding Contributor:

Proposed total budget UO3 Institution: AO Città della Salute e della Scienza di Torino (Euro)

Costs	Budget Year 1	Budget Year 2	Budget Year 3	TOTAL BUDGET	Co-Funding	List of costs proposed for funding to the moh
1 Staff salary	30.000,00	30.000,00	30.000,00	90.000,00	90.000,00	
2 Researchers contracts	0,00	38.000,00	0,00	38.000,00	0,00	38.000,00
3a Equipment (leasing)	6.900,00	2.300,00	2.300,00	11.500,00	0,00	11.500,00
3b Supplies	1.000,00	1.000,00	1.000,00	3.000,00	0,00	3.000,00
3c Model costs	0,00	0,00	0,00	0,00	0,00	0,00
4 Subcontracts	0,00	0,00	0,00	0,00	0,00	0,00
5 Patient costs	0,00	0,00	0,00	0,00	0,00	0,00
6 IT services and data bases	1.500,00	1.500,00	1.500,00	4.500,00	0,00	4.500,00
7 Travels	0,00	0,00	0,00	0,00	0,00	0,00
8 Publication costs	0,00	0,00	0,00	0,00	0,00	0,00
9 Overheads	6.300,00	0,00	0,00	6.300,00	0,00	6.300,00
10 Coordination costs	0,00	0,00	0,00		0,00	
Total	45.700,00	72.800,00	34.800,00	153.300,00	90.000,00	63.300,00

Report the Co-Funding Contributor:



Ministero della Salute
Direzione Generale della Ricerca Sanitaria
e Biomedica e della Vigilanza sugli Enti
BANDO 2013 PROGETTI DI RICERCA
PROGETTO COMPLETO

Project Title:
The PRIORITY Study - PRedicting long term Outcomes after Isolated coronary artery bypass surgery

Project Code: GR-2013-02359264

Principal Investigator: BARILI FABIO

Research Type: Clinical health care research/Clinico-assistenziale

Applicant Institution: Piemonte

Project Type: Young Researcher (under 40 years)/Giovani Ricercatori

PRINCIPAL INVESTIGATOR PROFILE

Name BARILI FABIO	Institution Department/Unit Position Title	Piemonte S. Croce Hospital - Department of Cardiac Surgery coordination of project activities, study design, data management, clinical advice, finalization of the research products, drafting of scientific papers
----------------------	--	---



Project Title:
 The PRIORITY Study - PRedicting long term Outcomes after Isolated coronary artery bypass surgery

Project Code: GR-2013-02359264

Principal Investigator: BARILI FABIO

Research Type: Clinical health care research/Clinico-assistenziale

Applicant Institution: Piemonte

Project Type: Young Researcher (under 40 years)/Giovani Ricercatori

Education/Training - Institution and Location	Degree	Year(s)	Field of study
Università degli Studi di Milano, Institute of Health Statistic and Biometry IBSUM, Via Vanzetti 5, 20133 Milan	Master Degree in Health Statistic and Biometry	1	Epidemiology, Model regressions, Meta-analyses; Time-to-event analyses; competing risk frameworks Dissertation of master degree: Competing risks analysis for ICU length of stay after cardiac surgery.
Università degli Studi di Milano, Via Festa del Perdono 7, 20122 Milan	Doctorate of Philosophy (Ph.D.) in Surgery and Transplantation	3	Bioengineering of allografts and prostheses with staminal cells Dissertation for PhD degree: Bioengineering of the homograft and development of a new bioreactor for dynamic recellularization of decellularized scaffolds.
Columbia University College of Physicians and Surgeons, Department of Cardiothoracic Surgery, New York, NY, USA	Postdoctoral Research Fellowship, Minimally invasive surgery/experimental surgery Licence for experimental surgery	1	Experimental surgery, research on minimally invasive surgery, research on atrial fibrillation; research on transplantation and assist devices; clinical research on outcomes
Università degli Studi di Milano, Centro Cardiologico Monzino IRCCS, Via Parea 4, 20138 Milan	Cardiac surgeon	5	Cardiac surgery; outcome research; bioengineering applied to cardio-vascular surgery. Banking of human allografts. Studies on new devices for cardiovascular surgery. Dissertation: "Homograft cryopreservation: effects on the extracellular matrix glycosaminoglycans"
Università degli Studi di Milano, Via Festa del Perdono 7, 20122 Milan	Medical Doctor (M.D.)	6	Health. Cardiology and cardiac surgery. Cardiovascular disease in women. Dissertation for M.D. degree: The effects of 17β-estradiol on endothelial function of arterial and venous grafts after coronary artery bypass grafting

Personal Statement

Fabio Barili, in his dual role of physician and statistician, will coordinate statistical analysis. He will contribute to the statistical analysis, above of all in his expertise field (competing risk framework), and address the translational part of the project, 'translating' the outcomes of the project into tools for the clinical practice. He will organize periodic meetings for



Ministero della Salute
 Direzione Generale della Ricerca Sanitaria
 e Biomedica e della Vigilanza sugli Enti
 BANDO 2013 PROGETTI DI RICERCA
 PROGETTO COMPLETO

Project Title: The PRIORITY Study - PRedicting long term Outcomes after Isolated coronary arTery bypass surgery	
Project Code: GR-2013-02359264	Principal Investigator: BARILI FABIO
Research Type: Clinical health care research/Clinico-assistenziale	Applicant Institution: Piemonte

Project Type: Young Researcher (under 40 years)/Giovani Ricercatori

information sharing and will lead the team who will participate to international and national congresses to present and disseminate the results of the study. He also will participate in writing all scientific papers.

Positions and Honors					
Institution	Division / Research group	Location	Position	From year	To year
University of Maryland School of Medicine, Baltimore, U.S.A.	Cardiac surgery	Baltimore, U.S.A	Statistical consultant	2014	2014
Columbia University College of Physicians and Surgeons	Division of Cardio-Thoracic Surgery	New York Presbyterian Hospital, Columbia University Medical Center, Milstein Hospital Building, 7GN-435 177 Fort Washington Avenue, New York, NY 10032, USA	Research fellow	2005	2005
Ospedale. S.Croce e Carle	Division of cardiac surgery	Via M. Coppino 26, 12100 Cuneo, Italy	Staff surgeon	2008	2014
Centro Cardiologico Monzino I.R.C.C.S., University of Milan	Department of cardiovascular surgery	Via Pare 4, 20138 Milan, Italy	Staff surgeon	2005	2008

Awards and Honors

Official H index: 10.0

Awards and Honors:

- 2000-2008: Scientific Board of B.I.O., Italian Regional Bank of Homografts
- 2010-now: Member, Aegis Cardiovascular Research Foundation, Fort Lauderdale, FL, USA
- 2012-now: Scientific committee of Outcomes, Italian Society of Cardiac Surgery (SICCH)
- 2013-now: Editorial staff member (Head, statistical analysis section), SICCH Journal
- 2013-now: Working Group on Cardiovascular Surgery, European Society of Cardiology
- 2014: Editorial Board, Giornale Italiano di Cardiologia
- 2014: Editorial Board, Journal of Cardiovascular Medicine

Other CV Informations:

- Abstracts' reviewer, 28th EACTS Annual Meeting. Milan, Italy. Oct 11th-14th, 2014
- Scientific committee, XXV National Congress of SICCH. Rome, Italy. Nov, 2014
- Abstracts' reviewer, 27th EACTS Annual Meeting. Vienna, Austria. Oct 5th-9th, 2013
- Scientific committee, XXVI National Congress of SICCH. Rome, Italy. Nov 10-13, 2012
- Abstracts' reviewer, 26th EACTS Annual Meeting. Barcelona, Spain. Oct 27th-31st, 2012



Project Title:
The PRIORITY Study - PRedicting long term Outcomes after Isolated coronary artery bypass surgery

Project Code: GR-2013-02359264

Principal Investigator: BARILI FABIO

Research Type: Clinical health care research/Clinico-assistenziale

Applicant Institution: Piemonte

Project Type: Young Researcher (under 40 years)/Giovani Ricercatori

Selected peer-reviewed publications

Best publications with bibliographic data		
Publications	N° of Citations	Impact Factor
Polvani G, Barili F, Dainese L, Topkara VK, Cheema FH, Penza E, Ferrarese S, Parolari A, Alamanni F, Biglioli P. Reduction ascending aortoplasty: midterm follow-up and predictors of redilatation. <i>Ann Thorac Surg</i> 2006;82:586-591	14	3.631
Topkara VK, Dang NC, Barili F, Martens TP, George I, Cheema FH, Bardakci H, Ozcan AV, Naka Y. Ventricular assist device use for the treatment of acute viral myocarditis. <i>J Thorac Cardiovasc Surg</i> 2006;131(5):1190-1.	15	3.991
Topkara VK, Dang NC, Barili F, Cheema FH, Martens TP, George I, Bardakci H, Oz MC, Naka Y. Predictors and outcomes of continuous veno-venous hemodialysis use after implantation of a left ventricular assist device. <i>J Heart Lung Transplant</i> 2006;25(4):404-408.	20	4.209
Thygesen K, Alpert JS, Jaffe AS, et al. Third universal definition of myocardial infarction. <i>Circulation</i> . 2012 Oct 16;126(16):2020-35. doi: 10.1161/CIR.0b013e31826e1058. Epub 2012 Aug 24.	184	14.948
Barili F, Pacini F, Capo A, Rasovic O, Grossi C, Alamanni F, Di Bartolomeo R, Parolari A. Does EuroSCORE II perform better Than its original versions? A multicenter validation study. <i>Eur Heart J</i> 2013;34(1):22-29. DOI: 10.1093/eurheartj/ehs342.	21	14.723

Best publications on the same topic of the project proposal		
Publications	N° of Citations	Impact Factor
Barili F, Pacini F, Capo A, Rasovic O, Grossi C, Alamanni F, Di Bartolomeo R, Parolari A. Does EuroSCORE II perform better Than its original versions? A multicenter validation study. <i>Eur Heart J</i> 2013;34(1):22-29. DOI: 10.1093/eurheartj/ehs342.	21	14.723
Barili F, Barzaghi N, Cheema FH, Capo A, Jiang J, Ardemagni E, Argenziano M, Grossi C. An original model to predict intensive care unit length-of stay after cardiac surgery in a competing risks framework. <i>Int J Cardiol</i> 2013;168(1):219-225.	0	6.175
Barili F, Di Gregorio O, Capo A, Ardemagni E, Rosato F, Argenziano M, Grossi C. Aortic valve replacement: Reliability of EuroSCORE in predicting early outcomes. <i>Int J Cardiol</i> 2010;144(2):343-345.	6	6.175
Barili F, Pacini D, Capo A, Ardemagni E, Pellicciari G, Zanobini M, Grossi C, Shahin KM, Alamanni F, Di Bartolomeo R, Parolari A. Reliability of New Scores in Predicting Perioperative Mortality After Isolated Aortic Valve Surgery: A Comparison With Society of Thoracic Surgeons Score and Logistic EuroSCORE. <i>Ann Thorac Surg</i> 2013; 95(5):1539-1544.	4	3.631
Barili F, Pacini D, Rosato F, Parolari A. The role of surgical procedures on discrimination performance of the updated EuroSCORE II. <i>J Thorac Cardiovasc Surg</i> 2013;146(4):986-987.	1	3.991



Ministero della Salute
 Direzione Generale della Ricerca Sanitaria
 e Biomedica e della Vigilanza sugli Enti
 BANDO 2013 PROGETTI DI RICERCA
 PROGETTO COMPLETO

Project Title:
 The PRIORITY Study - PRedicting long term Outcomes after Isolated coronary artery bypass surgery

Project Code: GR-2013-02359264

Principal Investigator: BARILI FABIO

Research Type: Clinical health care research/Clinico-assistenziale

Applicant Institution: Piemonte

Project Type: Young Researcher (under 40 years)/Giovani Ricercatori

Most recent publications

Publications	N° of Citations	Impact Factor
Barili F, Pacini D, Rosato F, Roberto M, Battisti A, Grossi C, Alamanni F, Di Bartolomeo R, Parolari A. In-hospital mortality risk assessment in elective and non-elective cardiac surgery: a comparison between EuroSCORE II and age, creatinine, ejection fraction score. Eur J Cardiothorac Surg. 2014 Jul;46(1):44-8. doi: 10.1093/ejcts/ezt581.	0	2.814
Barili F, Pacini D, Grossi C, Di Bartolomeo R, Alamanni F, Parolari A. Reliability of new scores in predicting perioperative mortality after mitral valve surgery. J Thorac Cardiovasc Surg. 2014 Mar;147(3):1008-12. doi: 10.1016/j.jtcvs.2013.06.042.	0	3.991
Barili F, Pacini D, Rosato F, Parolari A. The role of surgical procedures on discriminative performance of the updated euroSCORE II. J Thorac Cardiovasc Surg. 2013 Oct;146(4):986-7. doi:10.1016/j.jtcvs.2013.06.006.	0	3.991
Barili F, Barzaghi N, Cheema FH, Capo A, Jiang J, Ardemagni E, Argenziano M, Grossi C. An original model to predict intensive care unit length-of stay after cardiac surgery in a competing risks framework. Int J Cardiol 2013;168(1):219-225.	0	6.175
Barili F, Pacini D, Capo A, Ardemagni E, Pellicciari G, Zanobini M, Grossi C, Shahin KM, Alamanni F, Di Bartolomeo R, Parolari A. Reliability of New Scores in Predicting Perioperative Mortality After Isolated Aortic Valve Surgery: A Comparison With Society of Thoracic Surgeons Score and Logistic EuroSCORE. Ann Thorac Surg 2013; 95(5):1539-1544.	4	3.631



Ministero della Salute
 Direzione Generale della Ricerca Sanitaria
 e Biomedica e della Vigilanza sugli Enti
 BANDO 2013 PROGETTI DI RICERCA
 PROGETTO COMPLETO

Project Title:
 The PRIORITY Study - PRedicting long term Outcomes after Isolated coronary artery bypass surgery

Project Code: GR-2013-02359264

Principal Investigator: BARILI FABIO

Research Type: Clinical health care research/Clinico-assistenziale

Applicant Institution: Piemonte

Project Type: Young Researcher (under 40 years)/Giovani Ricercatori

Biographical Sketch Contributors 1

Name:
 Lacorte Eleonora

Institution and Position Title:
 Istituto Superiore di Sanità
 collaboration to the study design of the project, screening of scientific publications to update scientific knowledge on the topic of the project; drafting of scientific papers

Personal Statement:

Degree in languages and literatures 2004, post-graduate course in systematic reviews, meta-analysis and guidelines in 2013, and Master's Degree in epidemiology and biostatistics in 2014. Her main experience is in the development of guideline and systematic reviews. Within the present project she will contribute to all phases of the project, with particular reference to the design of the study, data management, epidemiological and statistical support, and to the screening of scientific publications to update scientific knowledge on the topic of the project and the drafting of scientific papers.

Institution	Division / Research group	Location	Position	From year	To year
National Institute of Health	National Centre for Epidemiology Surveillance and Health Promotion	Rome	Researcher	2008	2014

Awards and Honors

Official H index: 2.0

Awards and Honors:
 None



Project Title:
 The PRIORITY Study - PRedicting long term Outcomes after Isolated coronary artery bypass surgery

Project Code: GR-2013-02359264

Principal Investigator: BARILI FABIO

Research Type: Clinical health care research/Clinico-assistenziale

Applicant Institution: Piemonte

Project Type: Young Researcher (under 40 years)/Giovani Ricercatori

Biographical Sketch Contributors 2

Name:
 evangelista andrea

Institution and Position Title:
 AO Città della Salute e della Scienza di Torino
 Data management, Health care cost evaluation;
 collaboration in drafting of scientific papers

Personal Statement:

Andrea Evangelista is a biostatistician. For his proven experience in the field of evaluative research and epidemiology he will contribute to the statistical analysis concerning the re-hospitalization costs and to the writing of the scientific papers representing the official output of the project.

Institution	Division / Research group	Location	Position	From year	To year
AO S. Giovanni Battista	Unit of Cancer Epidemiology	Torino, Italy	Biostatistician	2006	2010
AUSL Reggio Emilia	Unit of Epidemiology	Reggio Emilia, Italy	Biostatistician	2010	2011
AO Città della Salute e della Scienza di Torino	Unità di Epidemiologia Clinica e Valutativa	Torino, Italy	Biostatistician	2011	2014

Awards and Honors

Official H index: 9.0

Awards and Honors:
 None



Ministero della Salute
 Direzione Generale della Ricerca Sanitaria
 e Biomedica e della Vigilanza sugli Enti
 BANDO 2013 PROGETTI DI RICERCA
 PROGETTO COMPLETO

Project Title:
 The PRIORITY Study - PRedicting long term Outcomes after Isolated coronary artery bypass surgery

Project Code: GR-2013-02359264

Principal Investigator: BARILI FABIO

Research Type: Clinical health care research/Clinico-assistenziale

Applicant Institution: Piemonte

Project Type: Young Researcher (under 40 years)/Giovani Ricercatori

Biographical Sketch Contributors 3

Name: Sorge Chiara
 Institution and Position Title: Regional Health Authority of Lazio- Department of Epidemiology Lazio Regional Health Service record linkage of clinical data with Hospital Discharge Records and Tax Registry, statistical analysis

Personal Statement:
 Chiara Sorge will contribute to some phases of the study with reference to the construction of PRIORITY Database. In particular her activity will be focused on the linkage of clinical data with Hospital Discharge Records and Tax Registry.

Institution	Division / Research group	Location	Position	From year	To year
Lazio Regional Health	Department of Epidemiology	Rome, Italy	Junior Statistician	2005	2010
Lazio Regional Health	Department of Epidemiology	Rome, Italy	Senior Statistician	2010	2014

Awards and Honors

Official H index: 3.0

Awards and Honors:
 None



Ministero della Salute
Direzione Generale della Ricerca Sanitaria
e Biomedica e della Vigilanza sugli Enti
BANDO 2013 PROGETTI DI RICERCA
PROGETTO COMPLETO

Project Title:
The PRIORITY Study - PRedicting long term Outcomes after Isolated coronary arTery bypass
surgerY

Project Code: GR-2013-02359264

Principal Investigator: BARILI FABIO

Research Type: Clinical health care research/Clinico-
assistenziale

Applicant Institution: Piemonte

Project Type: Young Researcher (under 40 years)/Giovani Ricercatori

Principal Investigator Data

Cognome: BARILI

Nome: FABIO

Codice fiscale: BRLFBA74T10F133A

Documento: Carta d'identità, Numero: AN0004920

Data di nascita: 10/12/74

Luogo di nascita: Merate

Provincia di nascita: CO

Indirizzo lavorativo: Via Coppino 26

Città: Cuneo

CAP: 12100

Provincia: CN

Email: fabio.barili@gmail.com

Altra email: fabarili@libero.it

Telefono: 3356600364

Altro telefono: 0171642571

Qualifica: Medico Chirurgo

Struttura: Servizio di Cardiocirurgia, Azienda Ospedaliera S.Croce e Carle Cuneo

Istituzione: Azienda Ospedaliera S.Croce e Carle Cuneo