Workshop on Effective Proposal Writing

A successful research proposal (An example)

27th June 2019

- **Before embarking on filling the grant application:**

  - What the study entails - objectives (discussions with co-investigator/collaborator)

  - Thorough literature search

  - If necessary a pilot study with a small number of sample (in some studies)

Section A

(1) Project Title

- reflect concisely and accurately the proposed project.

- avoid titles - distant or potential application of the proposed work, or a greater aspiration or goal than is to be expected

Determination of association of risk factors for development of coronary artery disease and nutritional status & immune status on the recovery following coronary artery bypass graft(CABG) surgery

(2) Research disciplines

Health Science   (relevant research area)

12 or any other)

(3) Category of research

(**Applied** [designed to solve specific practical problems]   or

Basic [expand existing scientific knowledge]

(4) Project Period (1-3 yrs)

2 yrs 6 months   (realistic)

(5) Total Budget   (correct final value)

≤ 1.5 m   (excluding RA payment)

Above 1.5 m

(6) Investigators *(Annex CVs' and list of publications of all investigators)*

- **Principal Investigator (leave > 2wks …)**
- **Co-investigator/s**
- **Collaborator/s**
- **Research Scientist/s**
- **Graduate Research Student/s**

STMIS Reg. No – compulsory

(6) Institution/s where research is to be performed

- **Principal institution**

  University of Sri Jayewardenepura

- **Other institution/s**

  Sri Jayewardenepura General Hospital,

  Nugegoda

Section B (no names or affiliations)

1. Summary *(one A4 page, font type Times New Roman, size 11, single space)*

- **Justification for what you intend to do**
  (should have a clear idea of the objectives)
  (data from literature)

- Ending with the intention ....

Thus this study attempts to study the association of common risk factors in the development of CVD and the requirement of CABG and to evaluate nutritional status and immunity status of patients undergoing CABG and to study the effect of both on the rate of recovery post operatively.

Keywords

2. RESEARCH PROBLEM

Research problem/s

What are the risk factors for development of CAD?

What are the nutritional and immunological factors that would affect development of CAD?

Do nutritional status and immunological factors affect recovery following CABG?

2. RESEARCH PROBLEM

ANALYSIS OF THE PROBLEM/S & RATIONALE FOR THE RESEARCH QUESTION

Why study the risk factors ?

Why study the nutritional /immune status?

Does post operative nutrition intake affect recovery?

literature

3. COMPREHENSIVE LITERATURE REVIEW IN THE RELEVANT AREA INCLUDING THE COMPLETE LIST OF REFERENCES.

International /Local (don't omit)

4) ORIGINALITY & INNOVATIVENESS OF THE PROPOSED WORK

- A comprehensive search on risk factors (traditional and biochemical) and their correlation with recovery from CABG.

- No studies related to assessing nutritional status and immune status in preoperative CABG patients and their association with rate of recovery

5. GENERAL AND SPECIFIC OBJECTIVES OF THE PROPOSED WORK

- **Overall aim (General Objective/s)**

  - To determine the association between CAD risk factors and the recovery following CABG.

  - To determine the variation between nutritional and immune status on recovery following CABG.

- **Specific Objective/s**

1. To determine the risk factors for coronary artery disease (CAD) in patients awaiting CABG.

2. To determine the nutritional and immune status of patients pre and post operative CABG.

3. To correlate above (1 & 2) with the rate of recovery following CABG.

4. To develop a suitable nutrient therapy for post operative patients following a study on their nutrient intake post operatively.

6. METHODOLOGY

(6.1) Describe the Study Methodology *(Attach additional sheets if necessary)*

1. Ethical clearance – will be obtained

2. Sample size & sampling (statistician)

   100 patients (?) at Sri Jayewardenepura General Hospital who are awaiting CABG surgery and following surgery who consent to take part in the study

- In parallel ordering of chemicals and methodology establishment for biochemical parameters to be determined in the Dept laboratory.

METHOD

Specific objective 1:

Determination of the risk factors for coronary artery disease (CAD) in patients awaiting CABG

- Development of the questionnaire (Data collecting tool) & standardization with a pilot study with 20 patients who are to undergo CABG.

- Risk factor assessment data will be collected via an interviewer-administered **questionnaire** from 100 pre-operative patients awaiting CABG surgery (Details of questionnaire) who consent to take part in the study

- Determination of lesser known risk factors by biochemical analyses (Lp(a), CRP

Sp objective 2

- **Determination of the nutritional and immune status of patients pre and post operative CABG**

a) **Nutritional status (pre operative)**
   anthropometric data / biochemical data

b) **Immunity (pre and post operative)**
   haematological/ clinical evaluation / wound healing

Nutritional & immunity data collection

- Acquisition of anthropometric (measured) /available laboratory analyses data from ward patient records & clinic records and investigation reports (pre and post operatively)

- **Blood samples** for assays will be collected from each patient **before and after** surgery.

  Determination of fibrinogen level, plasma proteins profile, vitamin A, glutathione, uric acid, total antioxidant capacity, cytokines [IL 1, IL6, IL 8] level, vitamins A & E of patients pre operatively,

- Determination of plasma proteins profile, vitamin A, glutathione, uric acid, total antioxidant capacity, cytokines [IL1, IL6, IL 8] levels post operatively

- Collect data on transfusion requirement; post operative effect on respiratory system (ventilation time, arteriole partial pressure of oxygen & CO_2, blood pH), renal function (urea, creatinine) and clinical evaluation of post operative lung and renal function & wound healing.

Sp objective 3

Correlation of data from questionnaire & immune/ nutritional data with the rate of recovery following CABG

- Satisfactory rate of recovery will be considered as ≤ 7 days post operative and more time than 10 days would be considered as delayed recovery (subject to no other complications due to sterility etc.)

- Data on nutritional and immune parameters (from objective 2; pre & post operative) would be prioritized and categorized into (low, normal, high where possible or other) depending on the data obtained and correlated with the rate of recovery.

- Rate of recovery will be correlated to age, sex and risk factors for associations

Sp objective 4:

- **Formulation of a suitable nutrient therapy for post operative patients**

- Feed intake data of post operative patients will be studied by collecting quantitative and qualitative data

- A diet regime or pattern will be developed/designed for patients who have problems related to food intake or whose nutritional status is considered inadequate. The food formulae and a best mode of feeding for such patients so that their recovery is not compromised due to low nutrient intake will be studied

6.2.2 Study site

- Data collection - SJGH

- Sample analyses -
    Dept of Biochemistry/FMS/USJ

6.2.3 Study group vs. controls

Study group:

- Consenting patient who will be undergoing CABG surgery at the cardio-thoracic unit, Sri Jayewardenepura General Hospital

- When studying the effect of nutritional status and immune status on the rate of recovery data will be compared with patients recovering satisfactorily during < 7 days against patients who will take more than 7 days.

- Nutrient intake data post operatively will also be studied/collected using patients whose intake of nutrients is normal against who have nausea and have lost appetite.

6.2.4 Validation and quality control of methods

- Most methods - currently being used either in the SJGH laboratory or Dept of Biochemistry research laboratory routinely and are validated against known controls each day.

- Standard curves will be used to validate concentrations that adhere to Beer-Lamberts Law for spectrophotometric quantification.

- New assays that will be used to determine parameters will be standardized against known standards. (QC – biochemical analyser)

6.2.5 Cost effectiveness of proposed methodology

- High end Instrument availability /

- Technical support / volunteers

6.2.5 Cost effectiveness of proposed methodology

Identification of potential risk factors in association with CABG in Sri Lankan population will lead to early interventions for prevention/reduction of incidence of CVD in the future which will improve the well being of people and decrease the economic burden for treatment.

6.3 Describe the method of data analyses statistician / under method

7. FEASIBILITY

7.1 Identify the human resources requirement - Knowledge & experience

7.1.1. *Principal Investigator*
(Names and affiliations should not be mentioned)

7.1.2 -4   Co–Investigator -1, 2, 3
(Names and affiliations should not be mentioned)

7.2 Work Plan (Please attach the Gantt chart to cover the proposed study)

■ key stages   ░ Sub activities of the key stages

Activity/sub activity	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	KPI
		1st year												2nd year												3rd year					
1) Literature review	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	
2) Pilot Study & methodology establishment	■	■	■	■																											
				#																											
3) Proper study					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■							
I) Questionnaire evaluation					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■								
a) Recruitment of patients					░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░									
b) Administration of the questionnaire					░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░									
II) Nutritional & immunity data collection						■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■								
a) anthropometric & available biochemical data							░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░									
b)& c) Determination of other parameters (Lp (a), fibrinogen level, etc) - pre & post operatively							░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░									
d) Collect data on transfusion requirement post operative effect on respiratory system, renal function & wound healing.							░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░									
													#								#										
III) Data correlation									■	■	■	■	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	■	■						
a) correlate the data on nutritional parameters to rate of recovery; immune parameters to rate of recovery													░	░	░	░	░	░	░	░	░	░	░	░	░	░					
b) Satisfactory rate of recovery correlation to age, gender, and risk factors.													░	░	░	░	░	░	░	░	░	░	░	░	░	░					
IV) Formulation of a suitable nutrient therapy for post operative patients					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■								
a) Study the feed intake of post operative patients (quantity & quality)					░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░									
b) Relate the above to recovery rate.																					░	░	░								
c) Development of a food formula for patients																					░	░	░								
																						░	#								
4) Thesis writing & manuscript preparation																					■	■	■	■	■	■	■	■	■	■	
Manuscript preparation																					░	░	░	░	░	░	░	░	░	░	
Thesis writing																					░	░	░	░	░	░	░	░	░	#	

Activity /subactivity	1st year				2nd year				3rd year (1/2)		KPI
	1	2	3	4	1	2	3	4	1	2	
1) Literature review											
2) Questionnaire development, Pilot Study & methodology establishment											Standardized questionnaire development.

Key Performance Indicators:

- **Standardized questionnaire development.**

- **Completion of collecting data/ biochemical parameters from 50 patients/ abstract presentation.**

- **Completion of collecting data/ biochemical parameters from latter 50 patients/ abstract presentation**

- **Recommendation of food formulae**

- **Full preliminary manuscripts (02) / thesis submission**

[Budgetary terms – fund utilization]

8. ETHICAL CONSIDERATION

- **needed or not / if applied**
- **before embarking on the study**
- **for publishing the results – imperative**

9. INDICATE THE HUMAN, GENETIC & ENVIRONMENTAL SAFETY ISSUES RELATED TO THE PROJECT AND HOW THEY ARE BEING ADDRESSED

- Human safety:

  Necessary precaution when working in the laboratory (lab coats, gloves, goggles) and will work in an environment used for the biological sample analyses.

- Environmental:

  All chemicals/samples used - disposed according to the methods adopted in the University Biochemistry research laboratory (autoclaved & disposed separately) and Hospital Biochemistry Laboratory.

(10)BUDGET

10.1 Financial support

- Is the proposed research currently being supported by any other grant/ considered by any other source for funding? Y / N

  If no -   Applied or planning to apply .....

  If Yes - Justify request for co funding

(10)BUDGET

10.2 Summary of Budget

- complete the table accurately

(1) **Personnel**	1st year	2nd year	3rd year	Total
(i) NSF Research Scientist*	-	-	-	-
(ii) Research Student**	300 000.00	300 000.00	150 000.00	750 000.00
(iii) Technical Assistant	-	-	-	-
(iv) Labour/ Other	-	-	-	-
Sub Total (Personnel)	300 000.00	300 000.00	150 000.00	750 000.00
(2) **Equipment*** Micro pipettes (100 µL and 20 µL) (ELISA)	200 000.00	-	-	200 000.00
Sub Total (Equipment)	200 000.00	-	-	200 000.00
(3) Consumables	385 500.00	420 000.00	84 000.00	889 500.00
(4) Laboratory Services and sample analysis	220 000.00	220 000.00	-	440 000.00
(5) Statistical analysis	-	-	5 000.00	5 000.00
(6) Calibration of instruments	4 000.00	8 000.00	-	12 000.00
(7) Postgraduate registration fees	50 000.00	50 000.00	50 000.00	150 000.00
(8) Travel & Subsistence	13 000.00	13 000.00	3 000.00	29 000.00
(8) (9) **Miscellaneous**	40 000.00	57 000.00	17 000.00	114,000.00
GRAND TOTAL	1 212 500.00	1 068 000.00	309 000.00	TOTAL

(11) BUDGET JUSTIFICATION

11.1 Personnel

- NSF Research Scientist
- NSF Research Student - M Phil (2.5 years) PG ?
- Technical Assistant
- Labourers

fill accurately

(i) **NSF Research Scientist***

    a. Full time for .... years/months.

Description of work to be carried out by the NSF Research Scientist:-

<div align="center">

Not applicable

</div>

(ii) **NSF Research Student ****

    a.   Full time for   **2.5/3.0**   years/months.

Description of work to be carried out by the NSF Research Student:-

Will take part in designing the experiments with the PI & other supervisors, data collection, all laboratory investigations other than what can be obtained from the hospital laboratory and analyses of data with the help of supervisors & statistician, write up of thesis, preliminary manuscripts and abstracts and presentation of data.

b. Research Student will be registering for a postgraduate degree
- Y **X**   N

M Phil

(iii) Technical Assistant

Full time/part time for .... years/months.

Description of work to be carried out by the Technical Assistant:-

Not applicable

(iv) Labourers

No. of labourers required for .... days/months.

Description of work to be performed:-

Not applicable

(11) BUDGET JUSTIFICATION

11.2 Laboratory Equipment

Details - quotations/brochures from dealers able to provide the type of equipment requested

- Actual need of the equipment (frequent usage) & sustainability (service providing)

Type/Model/Supplier	QTY	Estimated Cost		Availability in the institute
		USD ($)	Rs.	
Micro pipettes (100 µL and 20 µL) Nichipet EX (Supplier will be the lowest quoted according to the specifications)	**02 + 02**		200 000.00	Available – but for accurate measurements need new
T O T A L				
Justification: For all Biochemical assays the measurement that are being carried out with micropipettes , accuracy of data is important as the results will be used to study real life situations of patients undergoing CABG surgery.				

11.3 Consumables

- **Attach the list** and give a complete description of type (e.g. Chemicals, glassware, <u>enzymes</u> etc), quantity (justify the quantity and type) and cost

- [If available –mention]

Consumables			ANNEX X
Chemicals	quantity	Cost	Justification
Methanol (2.5L)	2 bottles	xxxx	HPLC mobile phase
Acetonitrile	8L	xxxxx	HPLC mobile phase
NaOH	500g	xxxxx	Buffer preparation/pH meter standardization
Na_2HPO_4	500g	xxxxx	Buffer preparation
ABTS	110 Tablets	xxxxx	Antioxidant activity
Vitamin E standard	2g	xxxx	HPLC standard
Glutathione kit	2 kits	xxxxxx	Spectrophotometer
Homocycteine kit	120 assays	xxxxx	Spectrophotometer
Cytokines (ILs 1,6,8)	120 (each) x3	xxxxxx	ELISA
Others		xxxxxx	
Tissue/liquid/soap/ brushes, gloves etc		xxxxxx	Cleaning
HPLC column (RP)	1	xxxxxx	Vitamin A/E analysis
Micropipette tips	500 (20 ul/1ml)	xxxxxx	Chemical analysis
Eppendorf tubes	2000	xxxxxx	
Microplates (ELISA)	120	xxxxxx	ELISA
Total			

Chemicals are requested for 100 analyses + analyses for methodology development.

11.4 Laboratory Services and Sample analysis (1/2/3 yrs) [outsourced]

1st Year Analysis of Serum protein (electrophoresis), fibrinogen, Lp(a) Rs 220 000.00
2nd Year Analysis of Serum protein (electrophoresis), fibrinogen, Lp(a) Rs 220 000.00

11.5 Statistical analysis (why funds ?)

- ## 11.6 Calibration of instruments (items)
  Calibration of instruments
- 1st Year

  In order to generate accurate measurements, calibration of the instrument (Biochemical Analyser) is necessary.

  Rs xxxxxxxxxxx
- 2nd Year

  In order to generate accurate measurements, calibration of the instruments (BBBBBBB) is necessary.

  Rs xxxxxxxxxxxx
- 3rd Year

  Not applicable

Calibration of instruments
1st Year In order to generate accurate measurements, calibration of the instrument (Biochemical Analyser) is necessary. Rs xxxxxxxxxxx
2nd Year In order to generate accurate measurements, calibration of the instruments (BBBBBBB) is necessary. Rs xxxxxxxxxxxx
3rd Year -

11.7 Postgraduate registration fees
1/2/3 years – separately

11.8 Travel & Subsistence

Travel - Rs 25/km
Places/ Distance (Km)/ No of visits / Total cost

Travel & Subsistence

As far as possible the grantee should combine field work under the project with his work in the Institution. What should be requested for is additional travelling that cannot be carried out in the course of the grantee's other duties

Give a detailed breakdown with justifications of the cost figures given in Summary Budget. Indicate No. of field visits, places to be visited and any other relevant details. Refer rates of payment sent with this form (Annex IV)

1st Year
- Blood samples and other data will be collected at General Hospital Sri Jayewardenepura. Some of analysis will be carried out at the university Biochemistry Research Laboratory.
- Travelling by bus (cost for going and coming back):   (50 visits)   Rs 13 000.00
   (2 x bus fare x 50 visits)   -

2nd Year
- Blood samples and other data will be collected at General Hospital Sri Jayewardenepura .Some of analysis will be carried out at the university Biochemistry Research Laboratory.
- Travelling by bus(cost for going and coming back):   (50 visits)   Rs 13 000.00

3rd Year
- Travelling by bus (cost for going and coming back):   (10-15 visits)   Rs 3 000.00
[It is expected to complete the study with 100 patients by the end of second year. However there may be some travelling involved to obtain other data once the thesis is being written].

11.9 Miscellaneous

The funds for miscellaneous, should <u>not exceed 10%</u> of the total cost of the project.

ITEMS	ESTIMATED COST			
	1st year	2nd year	3rd year	Total
Literature (otherwise unavailable)	15 000.00	6000.00	-	21000.00
Publication (cost)	-	6000.00	15000.00	21000.00
Computer software	-	10000.00	-	10000.00
Registration fees for seminar/work shop/National conferences	5000.00	5000.00	2000.00	12000.00
Extra analysis	20 000.00	30000.00	-	50000.00
Total	40 000.00	57 000.00	17 000.00	14,000.00

11.10 Available equipment and other facilities

o Major equipment and facilities

o Research/Technical assistance and labour provided by the Institution

o Other resources and support services available to the project in the Institution or outside.

12 RESEARCH OUTPUT/S

- Determination of the association between modifiable and non modifiable risk factors of CAD and the outcome after CABG

- Determination of the effect/association of an individual's nutritional and immune states on the recovery from CABG.

- Development of nutritionally suitable formulae for improvement of rate of recovery in patients who are unable to take in food.

13. RESEARCH OUTCOMES

IMPACT OF RESEARCH OUTCOMES TO NATIONAL / SOCIO-ECONOMIC DEVELOPMENT OF SRI LANKA.

- **Improving well-being of the people**
  If the prevalence of CVD can be decreased by early detection and interventions this may lead to a healthy adult population and more productive nation.

Significance

- Formulation of evidence based policies/ guidelines
  - Results can be incorporated to the guidelines formulated by the NCD committee on CVD.

  - Treatment modalities/procedures for patients whose nutritional status and immunity is not optimal could be improved and incorporated into guidelines.

- Human resource development in R&D
  - A graduate student would be trained in advance research methodologies / techniques and other areas such as presentation and writing skill and will be registered for a M Phil

- Institutional strengthening in R&D infrastructure
  - New biochemical parameter detection methods will be established in the Dept of Biochemistry which will be utilized for further under- as well as postgraduate training.

- Researchers /General public / Other
  - Results can be utilized by the surgical teams to improve the outcomes of the CABG surgery /reduce the costs for prolonged treatment and reduce morbidity and mortality among patients undergoing CABG.

(14) HOW DO YOU PROPOSE TO PROTECT AND EXPLOIT INTELLECTUAL PROPERTY (IP)?

-

(15/16) SIGNATURES / RECOMMENDATIONS

If the applicants are from different institutions, recommendations from each institution should be submitted

Head/Dean/VC

- ***Three copies of the completed application form*** with annexes

  (List of consumables/ CVs/ Consent of
     Collaborator /List of publications (last 10 yrs)/
     Record of grants received (5 yrs))

  should be sent to:
  The Director,
  National Science Foundation,
  47/5, Maitland Place, Colombo 7.

- *An electronic version <u>should </u>also be e-mailed to* <u>grants2012@nsf.ac.lk</u> on or before the deadline.

- **Head & Staff of Research Division**

- **All of you**

You are on the way up

Good Luck