

# STUDY PROTOCOL

## PROTOCOL TITLE:

The use of a visual decision aid for shared decision making among patients with chest pain

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1

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# **STUDY PROTOCOL**

## **1. BACKGROUND AND RATIONALE**

### **1.1. General Introduction**

The Chest Pain Choice (CPC) decision aid is a visual aid that was developed to facilitate shared decision-making between physicians and patients who present to the emergency department with chest pain. Shared decision making with the use of this visual aid has been shown in other centres to be associated with greater patient knowledge, greater patient involvement in decision making and less frequent admissions, with no increase in major adverse cardiac events (MACE) due to the intervention. The visual aid includes a brief description of what tests have been done thus far to assess the patient's risk of MACE, a graphic representation of the risk as calculated based on the HEART score, as well as the evaluation options available. The visual aid has been modified from its original form for the local context in terms of viable options for further evaluation. Please see Appendix 1 for an example of the CPC visual aid.

### **1.2. Rationale and justification for the Study**

This study aims to evaluate the use of the CPC decision aid as a tool to facilitate discussion between the patient and his/her attending physician with regard to subsequent management plans. Patients aged 21 years and above with low-risk chest pain, as determined by the HEART score (HEART score 0-3), will be included. Our hypothesis is that incorporating the Chest Pain Choice visual aid in shared decision making can help to reduce unnecessary admissions for low risk chest pain to the observation ward, as well as increase patient knowledge with regards to their own condition.

#### **a. Rationale for the Study Purpose**

Chest pain is a common presenting complaint in the Emergency Department (ED). Cardiac testing in low-risk patients poses unnecessary costs and resource utilisation, which may in part be due to clinicians adopting a very-low-risk threshold for discharge without testing. The use of the Chest Pain Choice - a visual aid - for shared decision making, has been shown to be effective in increasing patient knowledge and decreasing the rate of admission to an observation unit for cardiac testing, among patients with chest pain who are at low risk for acute coronary syndromes. This can be adapted to our local context to decrease unnecessary admissions to the ED observation unit (referred to as the Extended Diagnostic Treatment Unit or EDTU in our institution). This study aims to assess if using a visual decision aid for shared decision making between physician and patient can safely help to decrease unnecessary admissions to the ED observation unit, as well as its impact on patient knowledge, satisfaction, as well as 30-day and 60-day Major Adverse Cardiac Events (MACE).

#### **b. Rationale for Study Population**

The target population is that of adults aged 21 years and above who present to ED with chest pain that is considered low risk based on the HEART score (HEART score 0-3). The HEART score is a validated scoring system for patients aged 21 years and above who present with

symptoms suggestive of Acute Coronary Syndromes. The HEART score assigns different points for various features in the patient's history, ECG features, age group, presence of risk factors, and initial troponin level, in order to generate a score that corresponds to a range of percentages for the risk of 6-week MACE. Patients with a HEART score of 0-3 correspond to a 6-week MACE risk of 0.9-1.7%. Since the risk of 6-week MACE is low in these patients, outpatient follow-up and cardiac testing for underlying coronary artery disease can be considered instead of ED observation unit admission. This is also in keeping with current institutional practices.

### **c. Rationale for Study Design**

This is a randomized controlled trial where subjects will be stratified by gender and then randomized 1:1 to either the control or the intervention arm. This is because gender may affect the cardiovascular risk significantly and hence affect the outcome of MACE.

## **2. HYPOTHESIS AND OBJECTIVES**

### **2.1. Hypothesis**

Incorporating the Chest Pain Choice visual aid in shared decision making can help to decrease unnecessary admissions for patients with low risk chest pain to the observation ward, as well as increase patient knowledge with regards to their own condition.

### **2.2. Primary Objectives**

1. We aim to evaluate if shared decision-making with patients using the Chest Pain Choice (CPC), a visual decision aid tool, will reduce admissions to the ED observation unit among patients with low-risk chest pain at the index visit to the emergency department.

### **2.3. Secondary Objectives**

1. To determine if the CPC can improve patient knowledge and increase patient involvement in shared decision-making
2. To evaluate the impact on the incidence of MACE, ED re-attendances and downstream cardiac evaluation (either stress tests or computed tomography of the coronary arteries) at 30-days and 60-days with the implementation of CPC

### **2.4. Potential Risks and benefits:**

#### **a. End Points – Efficacy**

The direct benefits among research participants who are randomized to the CPC arm are that they may have a better understanding regarding their condition and feel more empowered in making a shared decision together with their attending physician.

The indirect benefit is that implementation of the CPC may safely reduce hospital admissions in patients with low-risk chest pain.

## **b. End Points – Safety**

There is a potential risk of breach of confidentiality. However, all research data will be kept in a password protected personal computer and identifiers will be kept separately. Access to the data will only be kept within the study team, including the PI and the Co-investigators.

There is a potential risk that patients under the intervention arm may have a higher incidence of 30-day or 60-day MACE, as the hypothesis is that more patients will choose to be discharged rather than be admitted to the ED observation unit, which may lead to a delay in further cardiac testing and definitive management. However, this is unlikely as the study includes only patients with a low overall risk of MACE (0.9-1.7%) who are not likely to require any cardiac intervention.

## **3. STUDY POPULATION**

### **3.1. List the number of subjects to be enrolled.**

A total of 200 subjects will be enrolled at the National University Hospital Emergency Department. There are no restrictions based on race. The study excludes children as it is targeted at patients with low-risk chest pain in an adult emergency department.

### **3.2. Criteria for Recruitment**

The patients will first be assessed by their primary physicians to ascertain if their chest pain is low-risk (based on the HEART score) and if they are suitable for recruitment. An initial serum troponin and ECG will be done prior to recruitment to risk stratify patients, and the consent process will take place only after the results of the serum troponin and ECG are released. Recruitment will take place from Sunday 0800 hours to Thursday 2359 hours, as inpatient stress testing or computed tomography of the coronary arteries in the ED observation unit are only available during weekdays.

### **3.3. Inclusion Criteria**

The subject must meet all the inclusion criteria to participate in the study:

- Aged 21 years and above
- Have low risk chest pain as defined by the HEART score (0-3 points)
- Be English-literate
- Have an initial serum troponin that is less than the 99th centile of the normal reference population
- Have an initial electrocardiogram that is not suggestive of cardiac ischaemia

### **3.4. Exclusion Criteria**

All subjects meeting any of the exclusion criteria at baseline will be excluded from participation:

- Have a HEART score of 4 or more

- Are not English-literate
- Have an elevated initial serum troponin
- Have an initial electrocardiogram that is suggestive of cardiac ischaemia (ST-segment depression or elevation, new onset left bundle branch block, T-wave inversions, etc.)
- Have known coronary artery disease
- Have a prior plan for cardiac intervention or admission
- Have barriers to outpatient follow-up
- Are prisoners
- Are pregnant
- Are hearing or visually impaired, or are otherwise unable to use the clinical decision aid
- Do not consent to participation in the study

### 3.5. Withdrawal Criteria

The study may be continued if the intervention has been shown to be associated with an increase in 30- or 60-day MACE as compared to the control arm.

### 3.6. Subject Replacement

Subjects who drop out will be replaced until the minimum number of 164 patients has been achieved.

## 4. TRIAL SCHEDULE

Patients will be screened at the ED for suitability before consent is taken. The subject's direct involvement will only be during their ED visit. The subjects will then be followed up at 60 days for 30- and 60-day MACE via a review of their electronic medical records or via telephone contact if electronic medical records are not available. No other study visits are required.

	July 18	Aug 18	Oct 18	Nov 18	Dec 18	Jan 19	Feb 19	Mar 19	Apr 19	May 19	June 19	July 19	Aug 19	Oct 19	Nov 19	Dec 19
Application of DSRB																
Study Recruitment																
Follow-up of patients																
Analysis of data																
Manuscript Writing																
Publication of Data																

## 5. STUDY DESIGN

This is a randomized controlled trial where subjects are stratified by gender and then randomized 1:1 to the intervention (CPC) or control arm (usual care). The patient, attending physicians, and study team will not be blinded. Study recruitment will take approximately 12 months. Subjects are only directly involved during their ED visit, and will not be required to

participate in further follow-up sessions. Subjects will be followed up at 60 days by a review of their electronic medical records or via telephone only if no electronic records are available.

### **5.1. Summary of Study Design**

The study is a randomized controlled trial, where subjects will be stratified by gender and then randomized 1:1 to the intervention or control arm, as gender has a significant impact on cardiovascular risk, and hence outcomes of MACE.

## **6. METHODS AND ASSESSMENTS**

This is a randomized controlled trial; involving patients aged 21 years and above with low risk chest pain. Patients enrolled will be stratified by gender and then randomized 1:1 into either the intervention arm (CPC) or control arm (usual care). Randomization will be done via an online randomization generator. Recruitment will take place from Sunday 0800 hours to Thursday 2359 hours as inpatient cardiac evaluation investigations such as stress tests and CTCA are only available during weekdays, hence limiting the utility of the ED observation unit on weekends. Those under the intervention arm will receive the Chest Pain Choice visual aid prior to discussion with their primary physician regarding disposition. Data will be collected regarding the patients' age, demographics, past medical history and co-morbidities, cardiovascular risk factors, current medications, variables regarding their current visit such as vital signs, symptoms, laboratory results and electrocardiogram results, treatment received at the emergency department, eventual disposition and downstream cardiac test results if any. In addition to this, patients will answer a questionnaire which will assess patient knowledge, perceptions regarding the information received during consultation, patient satisfaction, as well as the Trust in Physician scale (a tool that assesses interpersonal trust in a patient-physician relationship) and the Decisional Conflict scale (an established tool that assesses personal perceptions regarding decision-making). Please see the data collection form and the patients' questionnaires in Appendix 2.

After discussion between the patient and his/her attending physician, patients will either be discharged from the emergency department with or without outpatient tests to evaluate their cardiac function (e.g. stress tests, CTCA) and/or outpatient Cardiology appointment or admitted to the ED observation unit for further observation and serial troponin testing, whereby further investigations for cardiac evaluation (e.g. stress tests, CTCA) may or may not be done or planned, at the discretion of the attending physician. There is variability in what is considered standard care, as it is dependent on several factors such as the patient's social set-up, availability of inpatient cardiac evaluation, etc., and hence standard care will not be strictly defined.

The patients in both groups will be assessed regarding their pre- and post-consultation knowledge as well as satisfaction during this visit by standardized questionnaires. The patients will be followed up at 60 days to find out if they had MACE, ED re-attendances, as well as whether further tests for cardiac evaluation were done. This will be done via a review of their electronic medical records or via telephone contact if electronic medical records are not available. A MACE is defined as all-cause mortality, myocardial infarction or coronary revascularisation.



## **6.1. Randomisation and Blinding**

Subjects will be stratified by gender and then randomized 1:1 to either the control arm or the intervention arm by the means of a computer program. Allocation will be done after recruitment via the means of sealed, opaque envelopes. The primary physician, study team and patient will not be blinded, as blinding is not possible. However, as the outcomes are objective, the risk of bias is minimal.

## **6.2. Study Visits and Procedures**

### *a. Screening Visits and Procedures*

Patients will be screened at the ED for suitability before consent is taken. Prior to recruitment, the patient will first be stabilized and assessed by their primary physician. Recruitment will only take place after an initial ECG has been done, and the results of the initial serum troponin has been released, as both the ECG results and serum troponin results are required to assess the patient's risk for subsequent MACE.

### *b. Study Visits and Procedures*

Patients enrolled will be stratified by gender and randomized 1:1 into either the intervention arm (CPC) or control arm (usual care). For patients with low risk chest pain, an initial electrocardiogram and serial troponin will be done as part of standard care. Serial serum troponin tests will also be taken at the discretion of the attending physician. Further tests to evaluate the patient's cardiac function such as stress tests (e.g. stress treadmill electrocardiogram, stress myocardial perfusion imaging, etc.) or a computed tomography of the coronary arteries (CTCA) may either be arranged as part of the patient's ED observation unit stay or outpatient as part of standard care. For research purposes, those under the intervention arm will receive the chest pain choice visual aid prior to discussion with their primary physician regarding disposition.

### *c. Post Study Follow up and Procedures*

The subjects will then be followed up at 60 days for 30-day and 60-day MACE, repeat ED attendance, and subsequent cardiac testing performed via a review of electronic medical records or contact via telephone if electronic medical records are not available. No other study visits are required.

### *d. Discontinuation Visit and Procedures*

Subjects may withdraw voluntarily from participation in the study at any time. Subjects may also withdraw voluntarily from receiving the study intervention for any reason. In these circumstances, patients will be treated with usual care, and follow-up will be as clinically indicated, as decided by their attending physician.

## **7. SAFETY MEASUREMENTS**

### **7.1. Definitions**

Serious adverse events are defined as either 30-day or 60-day MACE. If there is an increase in 30-day or 60-day MACE amongst subjects in the intervention arm during interim analysis at 50% of our recruitment target, the PI will be responsible for reporting this to the DSRB.

### **7.2. Collecting, Recording and Reporting of “Unanticipated Problems Involving Risk to Subjects or Others” – UPIRTSO events to the NHG Domain Specific Review Boards (DSRB)**

**UPIRTSO events** refers to problems, in general, to include any incident, experience, or outcome (including adverse events) that meets ALL of the following criteria:

#### **1. Unexpected**

In terms of nature, severity or frequency of the problem as described in the study documentation (eg: Protocol, Consent documents etc).

#### **2. Related or possibly related to participation in the research**

Possibly related means there is a reasonable possibility that the problem may have been caused by the procedures involved in the research; and

#### **3. Risk of harm**

Suggests that the research places participants or others at a greater risk of harm (including physical, psychological, economic, or social harm) than was previously known or recognized.

#### **Reporting Timeline for UPIRTSO Events to the NHG DSRB.**

1. Urgent Reporting: All problems involving local deaths, whether related or not, will be reported immediately – within 24 hours after first knowledge by the PI.
2. Expedited Reporting: All other problems will be reported as soon as possible but not later than 7 calendar days after first knowledge by the PI.

### **7.3. Safety Monitoring Plan**

The PI and study team will perform data and safety monitoring. The data will be reviewed on a quarterly basis and both adverse and serious adverse events such as 30- and 60-day major adverse cardiac events will be monitored. The principal investigator will review the study data on a quarterly basis for completeness. Data integrity will be assured by the means of doing spot checks on the data collected and comparison with the patient's electronic records. The study will be stopped based on safety if it is shown that there is an increase in 30- or 60-day MACE for patients in the intervention arm. The dissemination of data and safety information will be done by the principal investigator via face-to-face contact and e-mail if necessary.

#### **7.4. Complaint Handling**

Complaints will be addressed by either the PI or one of the co-investigators. Contact details of the PI are given to the participants at time of consent taking as part of the consent process, so that complaints or inquiries can be made. If the data obtained is pertaining to an UPIRTSO event or adverse outcome, it will be reported to the NHG DSRB.

### **8. DATA ANALYSIS**

#### **8.1. Data Quality Assurance**

The principal investigator will review the study data on a quarterly basis for completeness. Data integrity will be assured by the means of doing spot checks on the data collected and comparison with the patient's electronic records.

#### **8.2. Data Entry and Storage**

All research data will be stored within the study site. Hardcopy data will be stored in designated locked cabinets in the PI's office that are accessible to authorized study personnel only. Electronic data will be stored on a secured computer that is password-protected. The databases will not contain subject identifiers and the data linking subject identifiers and the subject identification codes will be stored separately. When portable media (e.g. CD, USB drives etc.) are used to store the data, subject identifiers are stored separately. The study team including the PI and co-investigators will have access to the research data. The research data will be destroyed after it has been stored for a minimum of 6 years.

### **9. SAMPLE SIZE AND STATISTICAL METHODS**

#### **9.1. Determination of Sample Size**

A sample size of 164 patients (82 in each arm) will provide 80% power to detect an absolute difference of 20% reduction in admissions to ED observation unit in the intervention arm between the 2 groups, with 2-sided alpha of 0.05.

#### **9.2. Statistical and Analytical Plans**

Intention-to-treat analysis will be carried out; proportions will be evaluated using chi-square tests, non-parametric variables with Mann-Whitney *U* and parametric variables with Student's *t* tests as appropriate.

An interim analysis will be done when 50% of recruitment has been reached to check for incidence of adverse outcomes such as 30-day or 60-day MACE. If there is a significant increase in 30-day or 60-day MACE in the intervention arm as compared to the control arm, the study will be stopped.

## **10. ETHICAL CONSIDERATIONS**

### **10.1. Informed Consent**

Informed consent will be taken after initial assessment and stabilization by the primary physician, and only after initial serum troponin and ECG results are released. If found suitable for the study, the patients will first be approached by their own treating physicians to participate in the project during their visit to the emergency department for consent to be referred to the study team. The investigators of the study will then obtain consent from the patients for the study.

The study team may also recruit patients where the attending physician is part of the study team, and the participant may share a dependent relationship with the study team. In order to prevent coercion or undue influence, participation is voluntary and the research participants may withdraw from the study at any time without any compromise in their medical care. For participants who are patients of the study team, their decision to participate in the research study will not affect the standard of care provided to them. Where possible, the informed consent process will be conducted by a qualified study team member, delegated by the PI, who is not involved in the primary care for the research participant.

The research participants will be recruited by face-to-face contact when they are in the emergency department. The subject will have sufficient time to consider his/her participation in the study, and have the option of discussing their participation with family members if needed. The consent process will take place in the emergency department within the patient's cubicle. There will be privacy to the patient and a non-threatening, quiet environment for the patient to assess the risks and benefits afforded to him/her with participation of the study. In situations where there is a dependent patient-doctor relationship, it would be emphasised that participation is entirely voluntary and there will be no negative consequences from possible refusal or withdrawal from the study. They will also be given ample time to read through the patient information sheet and decide without any influence or coercion.

The PI and co-investigators will obtain consent from the subjects. A team log will be kept to identify the members as well as their responsibilities within the study. There will not be recruitment of non-English speakers, children, illiterate or non-writing individuals, as the study precludes that only English-literate subjects aged 21 years and above will be able to be recruited. Appendix 3 includes the informed consent form that will be used during the study.

### **10.2. IRB review**

The study team will provide for the review and approval of this protocol and the associated informed consent documents by the IRB / NHG DSRB.

### **10.3. Confidentiality of Data and Patient Records**

Research data will be coded, and links between the subjects' identifiers and the codes will be stored on a separately from the research data. Hardcopy data will be stored in a locked cabinet in the PI's office, accessible to authorized study personnel only. Electronic data will be stored on in a secured computer that is password-protected. The databases will not contain subject identifiers and the data linking subject identifiers and the subject identification codes will be stored separately. Research data will not be released to individuals or entities outside the

institution.

## **11. PUBLICATIONS**

If the results of this study are published, they will be credited to members of the study team if they have made significant contributions to the study design, execution and manuscript writing/editing.

## **12. RETENTION OF TRIAL DOCUMENTS**

Records for all participants, including CRFs, all source documentation (containing evidence to study eligibility, history and physical findings, laboratory data, results of consultations, etc.) as well as IRB records and other regulatory documentation will be retained by the PI in a secure storage facility. The records will be accessible for inspection and copying by authorized authorities. Hardcopy study documents will be kept under lock and key in the PI's office, and softcopy data will be kept in a password protected file, with patient identifiers stored separately, and access limited only to the study team. These study documents and data will be kept for a minimum of 6 years after completion of the study.

## **List of Attachments**

- Appendix 1      Chest Pain Choice Visual Aid**
- Appendix 2      Questionnaires used in the Trial**
- Appendix 3      Sample Patient Information Sheet and Informed Consent Form**