#### SUPPLEMENTAL MATERIAL

**Data S1.** Example of a Discrete Choice Experiment Survey Examining Preferences of Patients with Chronic Kidney Disease for Invasive Versus Conservative Treatment of Acute Coronary Syndrome

#### Introduction to the Survey

Thank you again for your interest! This survey is being administered to ~250 people with chronic kidney disease (CKD). You have been invited to participate in this survey because you have been diagnosed with chronic kidney disease and may have an increased risk of a heart attack. People with chronic kidney disease often face more challenging decisions when weighing the benefits and risks of the different treatment options for a heart attack.

For this survey we will ask you to imagine you have been taken to hospital and diagnosed with a heart attack. It has questions where we ask you to choose between different treatment options for heart attack and, questions about you and your health. The results of this survey will help us better understand what is important to people with chronic kidney disease when choosing between these treatments.



## **Describing a Heart Attack**



For the purposes of this study, **heart attack** refers to a situation where the blood supplied to the heart has been reduced but not stopped.

If someone were to present to hospital with heart attack symptoms, the doctor would order blood tests and an electrocardiogram to understand the conditions affecting the heart. In addition, medications would be started immediately to reduce the work demands of the heart, lower blood pressure and prevent blood clotting.

Following these initial steps, the patient and doctor would decide on the most appropriate treatment approach.



# **Heart Attack Treatment**

Generally, there are two treatment approaches for a heart attack:

1) One alternative is to proceed directly to an angiogram procedure within one to three days. An angiogram involves passing small tubes inside the body to the heart, and using X-ray pictures to locate the areas of reduced blood flow. This may lead to further heart procedures and interventions such as the use of balloons and stents to open up blocked blood vessels or, recommendations for open heart surgery to bypass the blockage. This treatment approach is typically referred as <u>early invasive management</u>.

2) The other alternative is to initially treat only with medications and perform a non-invasive stress test instead of an angiogram. If this test is very abnormal or if symptoms or signs of a heart attack persist, an angiogram would then be scheduled. This treatment approach is typically referred to as <u>conservative</u> <u>management</u>.

The following pages describe the angiogram procedure in more detail.



## The Angiogram

An angiogram is a special X-ray of the coronary arteries of the heart. A dye is injected into the coronary arteries which then show up on the X-ray. The purpose of the angiogram is to show the exact location and severity of any arteries that have narrowed through the build-up of fatty patches called 'plaques'.

A doctor will insert a small flexible tube (catheter) into a blood vessel in the groin or arm. The doctor will gently push the catheter up the blood vessel towards the heart. When the catheter reaches the main coronary artery, dye is injected and several rapid X-rays are taken. A moving picture is built up from these X-rays and this is called an angiogram. The dye shows the vessels filling with blood and the narrowed arteries can be seen on the angiogram.

The following illustration shows an overview of an angiogram.



## **Early Invasive Management or Conservative Management?**

The doctor will discuss the treatment options with the patient and only recommend an angiogram if they feel the patient has potential to benefit from the procedure.

Regardless of which treatment is chosen, the followings adverse outcomes may still occur:

• temporary or permanent reductions in kidney function because of medications prescribed following a heart attack

- another heart attack
- death

The major benefits related to the angiogram procedure may include:

- · decreased risk of another heart attack following hospital discharge
- improved life expectancy
- · decreased risk of being readmitted to hospital

The major <u>risks</u> related to the angiogram procedure may include:

- temporary or permanent reductions in kidney function because of dyes injected during the procedure
- a heart attack induced during the procedure
- slight chance of death during or immediately following the procedure
- procedure related bleeding



## Introduction to "Choice Questions"

On the next few pages we will introduce you to the choice questions.

We ask you to imagine you have been diagnosed with a heart attack and are choosing between the treatment alternatives shown.

Each choice question will consist of two treatments and each treatment will have a treatment approach and four different characteristics describing potential complications. Please note, <u>the treatment</u> <u>alternatives are not necessarily comparing Invasive Management to Conservative Management</u>.

Sometimes the treatment approach will both be Invasive Management (or Conservative Management) and the risks associated with the potential complications will vary. You will be asked to <u>pick the ONE</u> <u>treatment you prefer</u> (even if both treatment approaches are Invasive Management and you would not consider an invasive procedure in a real-life situation).

There are no wrong answers... we are interested in **YOUR preferences.** 

First we will start with a "warm-up" example for you to get used to the style of questions...



#### Warm-up example

If these two treatment options were presented to you by your doctor, which would you choose (hover your mouse over the green or black text for more information)?

	Treatment A		Tre	atment B
Treatment Approach	An angiogram is performed immediately upon admission		Conserva results in he angiogr	tive management eart stability and no ram is required
Risk of another heart attack within one year	Moderate (9 out of 100 people)		Low (6 out of 100 people)	
Risk of death within one year	High (15 out of 100 people)		Moderate (9 out of 100 people)	
Risk of kidney damage requiring dialysis only during the hospital admission for a heart attack, afterwards kidney function recovers	Moderate (3 out of 100 people)		Low (1 out of 100 people)	
Risk of kidney damage resulting in the need for permanent dialysis or kidney transplant	High (10 out of 100 people)		Moderate (5 out of 100 people)	
		Select		Select



#### Great!

The picture below is another way of showing that "10 people out of 100" will experience an adverse event following a heart attack. Each box represents one person treated for a heart attack. Coloured boxes represent those who experienced an adverse event, clear boxes represent those who recovered:







We are now ready to begin.

Some of the choices may be difficult but we ask you to **<u>select just one</u>** (your **<u>MOST</u>** preferred), as this is important for the research study.

In addition, in the scenarios that follow, sometimes the numbers (levels) may be the same for two or three of the risks for each treatment alternative or some numbers may be the same for consecutive scenarios. Further, sometimes the treatment approach will be the same for both alternatives. However, over the eight scenarios presented, all numbers will change and we ask that you pay close attention to the level of each risk. Our goal is to determine which treatment risks and the level of those risks most important to you.

Thank-you again for your participation!



choose (hover your m	nouse over the g	green or black text for	more information	n)?	
	Trea	atment A	Treatment B		
Treatment Approach	Conservative management results in heart stability and no angiogram is required		An angiogr immediately	gram is performed ly upon admission	
Risk of death within one year	Moderate (9 out of 100 people)		Low (3 out of 100 people)		
Risk of kidney damage requiring dialysis only during the hospital admission for a heart attack, afterwards kidney function recovers	High (10 out of 100 people)		Low (1 out of 100 people)		
Risk of another heart attack within one year	Moderate (9 out of 100 people)		High (12 out of 100 people)		
Risk of kidney damage resulting in the need for permanent dialysis or kidney transplant	High (10 out of 100 people)		Low (1 out of 100 people)		
		Select		Select	

choose (hover your m	ouse over the g	green or black text for	by your doctor, w more information	hich would you n)?	
	Trea	atment A	Tre	atment B	
Treatment Approach	An angiogram is performed immediately upon admission		Conservat results in he angiogr	ive management art stability and no am is required	
Risk of death within one year	Low (3 out of 100 people)		Moderate (9 out of 100 people)		
Risk of kidney damage requiring dialysis only during the hospital admission for a heart attack, afterwards kidney function recovers	Low (1 out of 100 people)		Moderate (3 out of 100 people)		
Risk of another heart attack within one year	Low (6 out of 100 people)		Moderate (9 out of 100 people)		
Risk of kidney damage resulting in the need for permanent dialysis or kidney transplant	High (10 out of 100 people)		Moderate (5 out of 100 people)		
		Select		Select	

choose (hover your m	nouse over the g	green or black text for	more information	n)?			
	Trea	Treatment A		atment B			
Treatment Approach	Conservative management results in heart stability and no angiogram is required		ent Conservative management ach results in heart stability and no angiogram is required		An angiogr immediately	iogram is performed ately upon admission	
Risk of death within one year	Low (3 out of 100 people)		High (15 out of 100 people)				
Risk of kidney damage requiring dialysis only during the hospital admission for a heart attack, afterwards kidney function recovers	Moderate (3 out of 100 people)		Moderate (3 out of 100 people)				
Risk of another heart attack within one year	Low (6 out of 100 people)		High (12 out of 100 people)				
Risk of kidney damage resulting in the need for permanent dialysis or kidney transplant	Moderate (5 out of 100 people)		Low (1 out of 100 people)				
		Select		Select			

If these two treatment choose (hover your m	alternatives we	ere presented to you l green or black text for	by your doctor, w	hich would you n)?	
	Trea	atment A	Tre	atment B	
Treatment Approach	An angiogram is performed immediately upon admission		Conservat results in he angiogra	Conservative management results in heart stability and no angiogram is required	
Risk of death within one year	Moderate (9 out of 100 people)		Low (3 out of 100 people)		
Risk of kidney damage requiring dialysis only during the hospital admission for a heart attack, afterwards kidney function recovers	High (10 out of 100 people)		High (10 out of 100 people)		
Risk of another heart attack within one year	High (12 out of 100 people)		Moderate (9 out of 100 people)		
Risk of kidney damage resulting in the need for permanent dialysis or kidney transplant	Low (1 out of 100 people)		High (10 out of 100 people)		
		Select		Select	
D - 7, T - treatment_Random4					

nicese (never year in	Tre	atment A	Tre	atment B		
Treatment Approach	An angiogram is performed immediately upon admission		An angiogram is performed immediately upon admission		Conservat results in he angiogra	ive management art stability and no am is required
Risk of death within one year	Moderate (9 out of 100 people)		Low (3 out of 100 people)			
Risk of kidney damage requiring dialysis only during the hospital admission for a heart attack, afterwards kidney function recovers	Low (1 out of 100 people)		High (10 out of 100 people)			
Risk of another heart attack within one year	Low (6 out of 100 people)		Low (6 out of 100 people)			
Risk of kidney damage resulting in the need for permanent dialysis or kidney transplant	Low (1 out of 100 people)		Moderate (5 out of 100 people)			
		Select		Select		

	Trea	Treatment A		atment B				
Treatment Approach	Conservative management results in heart stability and no angiogram is required		ch Conservative management results in heart stability and no angiogram is required		eatment Conservative management pproach results in heart stability and no angiogram is required		An angiog immediatel	ram is performed y upon admission
Risk of death within one year	High (15 out of 100 people)		Moderate (9 out of 100 people)					
Risk of kidney damage requiring dialysis only during the hospital admission for a heart attack, afterwards kidney function recovers	Low (1 out of 100 people)		Low (1 out of 100 people)					
Risk of another heart attack within one year	High (12 out of 100 people)		Moderate (9 out of 100 people)					
Risk of kidney damage resulting in the need for ermanent dialysis or kidney transplant	High (10 out of 100 people)		Moderate (5 out of 100 people)					
		Select		Select				

If these two treatment choose (hover your m	alternatives we ouse over the g	re presented to you l reen or black text for	by your doctor, wh more information	hich would you ו)?		
	Trea	tment A	Treatment B			
Treatment Approach	An angiogram is performed immediately upon admission		An angiogram is performed immediately upon admission		Conservati results in hea angiogra	ive management art stability and no am is required
Risk of death within one year	High (15 out of 100 people)		Low (3 out of 100 people)			
Risk of kidney damage requiring dialysis only during the hospital admission for a heart attack, afterwards kidney function recovers	Moderate (3 out of 100 people)		High (10 out of 100 people)			
Risk of another heart attack within one year	Moderate (9 out of 100 people)		Low (6 out of 100 people)			
Risk of kidney damage resulting in the need for permanent dialysis or kidney transplant	High (10 out of 100 people)		Low (1 out of 100 people)			
	\$	Select		Select		
D - 7, T - treatment_Random7						

If these two treatment	alternatives we	re presented to you b	by your doctor, where the second second	hich would you		
choose (nover your m	ouse over the g	tment A	Trea	atment B		
Treatment Approach	An angiogram is performed immediately upon admission		nent An angiogram is performed bach immediately upon admission		Conservati results in hea angiogra	ive management art stability and no am is required
Risk of death within one year	High (15 out of 100 people)		Moderate (9 out of 100 people)			
Risk of kidney damage requiring dialysis only during the hospital admission for a heart attack, afterwards kidney function recovers	High (10 out of 100 people)		Low (1 out of 100 people)			
Risk of another heart attack within one year	High (12 out of 100 people)		Low (6 out of 100 people)			
Risk of kidney damage resulting in the need for permanent dialysis or kidney transplant	Moderate (5 out of 100 people)		High (10 out of 100 people)			
	\$	Select		Select		
D - 7, T - treatment_Random8						

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Completing the treatment alternative questions ("choice questions") in this survey helped me to understand my own treatment preferences.	0	Ο	0	Ο	0
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Final Set of Questions
What is your age?
What is your sex?
Female
Male
O Not Wish to Answer
Where were you born?
Canada
United States
Central or South America
Western Europe
Eastern Europe
South Asian
Asia
Africa
Australasia
O not wish to answer

Are you?
, ac you.
Non-indigenous
Indigenous
Metis
MEDICINE CALGARY

Do you know your current eGFR level or your current percentage of kidney function (e.g., less than 15, 15-30, 30-45)? Leave blank if you do not know.
What YEAR were you diagnosed with chronic kidney disease by your doctor?
Have you been told you have proteinuria (albumin) in your urine tests:
Yes
No
O Unsure
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Have you previously had a heart attack?
Yes
No
Unsure
Have you previously had a stroke?
⊘ Yes
No
Unsure
Have you previously had any of the following invasive heart procedures?
Angiogram
Angioplasty or Stent
Cardiac surgery (coronary artery bypass graft)
Other (please specify)
None of the Above

Which of the following is the	ne cause of your chronic kidney disease or a condition that you also have?
Diabetes	
📃 High blood-pressure	
Polycystic kidney dise	ease
Glomerulonephritis	
Other (please specify	
Have you ever had an epi	sode of acute kidney injury?
Yes	
No	
Not sure	
Have you ever required dia	alysis treatment?
Yes	
No	
Have you ever attended d	alysis modality education sessions?
🥥 Yes	
No	
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<ul> <li>Have you decided which treatment you would choose if you progressed to kidney failure?</li> <li>Dialysis</li> <li>Kidney Transplant</li> <li>Conservative Care (no dialysis)</li> <li>Have Not Decided</li> </ul> If you have completed a Goals of Care Designation Order, please indicate which level of the GDC you have chosen, otherwise select Have Not Completed a GDC: <ul> <li>R - Medical care and interventions, including resuscitation if required</li> <li>M - Medical care and interventions, excluding resuscitation</li> </ul>			
<ul> <li>Dialysis</li> <li>Kidney Transplant</li> <li>Conservative Care (no dialysis)</li> <li>Have Not Decided</li> </ul> If you have completed a Goals of Care Designation Order, please indicate which level of the GDC you have chosen, otherwise select Have Not Completed a GDC: <ul> <li>R - Medical care and interventions, including resuscitation if required</li> <li>M - Medical care and interventions, excluding resuscitation</li> </ul>			
<ul> <li>Kidney Transplant</li> <li>Conservative Care (no dialysis)</li> <li>Have Not Decided</li> </ul> If you have completed a Goals of Care Designation Order, please indicate which level of the GDC you have chosen, otherwise select Have Not Completed a GDC: <ul> <li>R - Medical care and interventions, including resuscitation if required</li> <li>M - Medical care and interventions, excluding resuscitation</li> </ul>			
<ul> <li>Conservative Care (no dialysis)</li> <li>Have Not Decided</li> </ul> If you have completed a Goals of Care Designation Order, please indicate which level of the GDC you have chosen, otherwise select Have Not Completed a GDC: <ul> <li>R - Medical care and interventions, including resuscitation if required</li> <li>M - Medical care and interventions, excluding resuscitation</li> </ul>			
<ul> <li>Have Not Decided</li> <li>If you have completed a Goals of Care Designation Order, please indicate which level of the GDC you have chosen, otherwise select Have Not Completed a GDC:</li> <li>R - Medical care and interventions, including resuscitation if required</li> <li>M - Medical care and interventions, excluding resuscitation</li> </ul>			
If you have completed a Goals of Care Designation Order, please indicate which level of the GDC you have chosen, otherwise select Have Not Completed a GDC: R - Medical care and interventions, including resuscitation if required M - Medical care and interventions, excluding resuscitation			
If you have completed a Goals of Care Designation Order, please indicate which level of the GDC you have chosen, otherwise select Have Not Completed a GDC: R - Medical care and interventions, including resuscitation if required M - Medical care and interventions, excluding resuscitation			
If you have completed a Goals of Care Designation Order, please indicate which level of the GDC you have chosen, otherwise select Have Not Completed a GDC: R - Medical care and interventions, including resuscitation if required M - Medical care and interventions, excluding resuscitation			
<ul> <li>If you have completed a Goals of Care Designation Order, please indicate which level of the GDC you have chosen, otherwise select Have Not Completed a GDC:</li> <li>R - Medical care and interventions, including resuscitation if required</li> <li>M - Medical care and interventions, excluding resuscitation</li> </ul>			
<ul> <li>R - Medical care and interventions, including resuscitation if required</li> <li>M - Medical care and interventions, excluding resuscitation</li> </ul>			
M - Medical care and interventions, excluding resuscitation			
<ul> <li>C - Medical care and interventions, focused on comfort</li> </ul>			
Have not completed a GDC or don't know			
O not wish to answer			
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Please consider your <b>PREFERRED ROLE</b> in decision making for your <u>chronic kidney disease</u> treatment.
Which ONE statement below BEST reflects your preferred role?
I prefer to make the final selection about which treatment I receive
I prefer to make the final selection of my treatment after seriously considering my doctor's opinion
I prefer that my doctor and I share responsibility for deciding which treatment is best for me
I prefer that my doctor makes the final decision about which treatment will be used, but seriously considers my opinion
I prefer to leave all decisions regarding my treatment to my doctor
Now, please consider your <b>ACTUAL ROLE</b> in decision making for your chronic kidney disease
treatment.
Which <b>ONE</b> statement below <b>BEST</b> reflects your actual role?
I make the final selection about which treatment I will receive
I make the final selection of my treatment after seriously considering my doctor's opinion
My doctor and I share responsibility for deciding which treatment is best for me
My doctor makes the final decision about which treatment will be used, but seriously considers my opinion
I leave all decisions regarding my treatment to my doctor
I am not asked for my opinion
MEDICINE CALGARY

Would you be interested in speaking with us furth	her about your experience?	
Yes		
No		
Please provide any comments below.		
FACULTY OF MEDICINE CALGARY		

The questionnaire is r	ow complete.	
Thank you for your time	and help!	
	Powered by Sawtooth Software	

**Table S1.** Identified Attributes and Levels from a Discrete Choice Experiment Examining Preferences of Patients with Chronic Kidney Disease for Invasive Versus Conservative Treatment of Acute Coronary Syndrome

Attribute	Levels
Invasive versus conservative treatment approach	<ul> <li>An angiogram is performed immediately upon admission</li> <li>Conservative management results in heart stability and no angiogram is required</li> </ul>
Risk of death within One year	3 out of 100 9 out of 100 15 out of 100
Risk of acute kidney injury requiring dialysis in hospital	1 out of 100 3 out of 100 10 out of 100
Risk of kidney damage resulting in the need for permanent dialysis or kidney transplant	1 out of 100 5 out of 100 10 out of 100
Risk of another heart attack within one year	6 out 100 9 out of 100 12 out of 100

**Table S2.** Internal Validity Test Comparison to Published Discrete Choice Experiments from a Discrete Choice Experiment Examining Preferences of Patients with Chronic Kidney Disease for Invasive Versus Conservative Treatment of Acute Coronary Syndrome

		Published <sup>18</sup> DCE
Test Type	DCE Study	Percentage
	Percentage	(Mean (SD))
Within-set dominated pairs*	18	18 (20)
Dominated preferences	35	22 (14)
Straight-lining	4	7 (11)

\* 10 failures from 55 tests

Abbreviations: DCE – Discrete Choice Experiment, SD – standard deviation

	Estimate		Relative
Attribute and Level	Mean (SE)	p-value	Importance*
Treatment			2.2%
Invasive	-3.41 (4.00)	0.396	
Conservative	3.41 (4.00)	0.396	
Heart attack			15.3%
6%	27.48 (6.12)	<0.001	
9%	-6.71 (5.99)	0.265	
12%	-20.76 (6.24)	0.001	
Mortality			42.8%
3%	65.54 (6.32)	<0.001	
9%	3.44 (5.84)	0.556	
15%	-68.99 (6.37)	<0.001	
AKI requiring dialysis			17.3%
1%	20.79 (6.92)	0.003	
3%	12.76 (6.85)	0.065	
10%	-33.56 (6.26)	<0.001	
ESKD			22.4%
1%	34.82 (6.22)	<0.001	
5%	0.82 (6.37)	0.897	
10%	-35.64 (6.47)	<0.001	

**Table S3.** Model Coefficients for the Categorical Multinomial Logit Model Used to Quantify the Relative Importance of Attributes for Patients with Chronic Kidney Disease for Invasive Versus Conservative Treatment of Acute Coronary Syndrome

\* Across the range of levels

Consistent Akaike Information Criteria: 1,333, Bayesian Information Criteria: 1,324

Abbreviations: SE – standard error, AKI – acute kidney injury, ESKD – end stage kidney disease.

	Estimate		Relative
Attribute and Level	Mean (SE)	p-value	Importance
Invasive Treatment	-3.33 (3.98)	0.402	2.1%
Conservative Treatment	3.33 (3.98)	0.402	
Heart attack	-8.07 (1.79)	<0.001	15.2%
Mortality	-11.23 (0.94)	<0.001	42.4%
AKI requiring dialysis	-6.31 (1.14)	<0.001	17.9%
ESKD	7.91 (1.21)	<0.001	22.4%

**Table S4.** Model Coefficients for the Continuous Multinomial Logit Model Used to Quantify the Relative Importance of Attributes for Patients with Chronic Kidney Disease for Invasive Versus Conservative Treatment of Acute Coronary Syndrome

Consistent Akaike Information Criteria: 1,302, Bayesian Information Criteria: 1297

Abbreviations: SE – standard error, AKI – acute kidney injury, ESKD – end stage kidney disease.

Attribute and Level	Estimate Mean (SE)	p-value	Relative Importance
Invasive Treatment	-2.05 (4.32)	0.637	14.4%
Conservative Treatment	2.05 (4.32)	0.637	
Heartattack	-9.47(1.17))	<0.001	16.7%
Mortality	-11.89 (0.85)	<0.001	32.8%
AKI requiring dialysis	-5.55 (0.80)	<0.001	15.5%
ESKD	-7.68 (0.97)	<0.001	20.6%

**Table S5.** Model Coefficients for the Continuous Hierarchical Bayes Model from a Discrete Choice Experiment Examining Preferences of Patients with Chronic Kidney Disease for Invasive Versus Conservative Treatment of Acute Coronary Syndrome

Abbreviations: SE – standard error, AKI – Acute Kidney Injury, ESKD – End Stage Kidney Disease

**Table S6.** Example Estimates from Share Preference Calculations for Treatment Choice scenarios from a Discrete Choice Experiment Examining Preferences of Patients with Chronic Kidney Disease for Invasive Versus Conservative Treatment of Acute Coronary Syndrome

Example 1	Treatment A	Treatment B
Treatment Approach	Conservative	Invasive
Heart attack risk	6%	9%
Mortality	12%	3%
AKI requiring dialysis	1%	3%
ESKD	5%	10%
Preference for Treatment Option	37%	63%

Example 2

Treatment Approach	Invasive	Invasive
Heart attack risk	9%	12%
Mortality	9%	9%
AKI requiring dialysis	3%	1%
ESKD	5%	10%
Preference for Treatment Option	79%	21%

Example 3

Treatment Approach	Invasive	Conservative
Heart attack risk	8%	6%
Mortality	3%	5%
AKI requiring dialysis	3%	4%
ESKD	1%	1%
Preference for Treatment Option	56%	44%

Abbreviations: AKI – acute kidney injury, ESKD – end stage kidney disease.

**Figure S1.** Sensitivity Analysis. Relative Importance of Attributes for the Overall Group and the Two Latent Class Groups Over the Range of Levels Excluding Patients Failing the Straight Line Test from a Discrete Choice Experiment Examining Preferences of Patients with Chronic Kidney Disease for Invasive Versus Conservative Treatment of Acute Coronary Syndrome.



Abbreviations: MI – myocardial infarction, AKI – acute kidney injury, ESKD – end stage kidney disease.