**Appendix 1: Injury Severity Score**

Injury Severity Score (ISS) is an anatomical scoring system that has been used as a measure of severity of traumatic injuries for a few decades in many trauma centres.

Each of six body regions (head, face, chest, abdomen, extremities including pelvis, external) is assigned an Abbreviated Injury Scale (AIS) between 0 and 6, and the ISS is equal to the sum of the squares of the highest three AIS scores. If there is a non-survivable injury to one region the AIS equals 6 and the ISS score is automatically assigned the maximum of 75.

**Appendix 2: Trauma Embolic Scoring System (TESS)**

Age: <30 years old =0, 30-64=1, 65 or older=2
ISS score: 1-9=0, 10-16=3, 17-25=3, >25=5
Obesity (body mass index >30): yes= 1
Ventilator use =/> 1 days: yes = 4
Lower extremity trauma: yes=2

**Appendix 3: Charlson co-morbidity index component and its weighting**

| Co-morbidity | Weight |
|---|---|
| Myocardial infarction | 1 |
| Congestive heart failure | 1 |
| Peripheral vascular disease | 1 |
| Cerebrovascular disease | 1 |
| Dementia | 1 |
| Chronic pulmonary disease | 1 |
| Connective tissue disease | 1 |
| Peptic ulcer disease | 1 |
| Mild liver disease | 1 |
| Diabetes mellitus | 1 |
| Hemiplegia | 2 |
| Moderate or severe renal disease | 2 |
| Diabetes with end-organ damage | 2 |
| Any tumour | 2 |
| Leukaemia | 2 |
| Lymphoma | 2 |
| Moderate to severe liver disease | 3 |
| Metastatic solid tumour | 6 |
| AIDS | 6 |

**Appendix 4**

Patient Label

Royal Perth Hospital

# Patient Information Sheet

**Detailed assessment of risks and benefits of inferior vena cava filters on patients with complicated injuries (the Da Vinci Trial)**

**Principal Investigator:** Clin. A/Prof Kwok M. Ho, Intensive Care Unit RPH

You are being invited to participate in a research trial because you have been admitted to the RPH Intensive Care Unit or the State Major Trauma Unit following a major trauma. This information sheet explains the trial and describes what will be involved should you decide to participate. Please read the information carefully and ask any questions you might have. You may also wish to discuss the trial with a relative or friend.

## Background and aim of the trial

Venous thromboembolism (VTE) is a significant health problem especially in hospitalised patients. Patients who have suffered major trauma and those that undergo surgery are at the greatest risk. For most patients, the standard of care is to use blood-thinning medications (prophylactic anticoagulation i.e. heparin) and intermittent pneumatic compression pumps to both lower limbs. However, there is a group of patients who are at very high risk of VTE but blood-thinning medications cannot be used, due to risk of bleeding from blood thinning medications (such as severe brain injury). In these patients, the options are to use no / minimal intervention or to place a filter in the big vein inside the abdomen (also called inferior vena cava [IVC]) to block the migration of clots from the legs to the lung circulation to prevent pulmonary embolism (PE) that can be life-threatening in severe cases. The current filters that are placed inside the IVC are retrievable when they are no longer needed and are usually called Inferior Vena Cava filters (IVCF). Although IVCFs have been widely used for over two decades as a mechanical means to prevent pulmonary embolism in patients who have contraindications to conventional VTE prophylactic measures, their effectiveness in this situation has not been established. Despite the uncertainty about its effectiveness, IVCFs are used for about 50-100 trauma patients who cannot receive blood-thinning drugs to prevent pulmonary embolism every year in Western Australia.

The aim of this trial is to assess the clinical effectiveness, benefits and harms, and also the cost-effectiveness of the early use of IVCF for trauma patients who have contraindications to pharmacological VTE prophylaxis and they are at high risk of having PE (e.g. complicated fractures of the pelvis, severe brain injury or spinal injury).

## What participation in the trial will involve

Patients who participate in this trial will be randomly separated into two groups (50% of the participants in each group). The first group of patients will be managed using a traditional

way of preventing VTE. For patients who can receive mechanical deep vein thrombosis (DVT) prophylaxis in the form of lower limb compression devices, they will receive this means of DVT prevention to the leg that is non-injured. Blood thinning drugs, such as heparin, that are commonly used to prevent DVT will be started at the discretion of the attending clinicians. Because this trial only considers patients who have contraindications to blood thinning drugs in the initial phase after their injuries, we expect the attending clinicians will not start the blood thinning drugs within the first three days, and in some cases, this delay could be up to 7 days or even longer.

The second group of patients, who have similar injuries as the first group, will receive an IVCF within the first 72 hours of injury as a means to prevent pulmonary embolism. The other treatments will be exactly the same as the first group of patients. All IVCFs will be removed before the patient is discharged from hospital or 90 days after the trauma, unless the treating doctor believes the IVCF should be left in for longer. All patients who have received an IVCF will have an abdominal x-ray before being discharged from hospital to make sure that either the IVCF has been removed entirely or, if it has not been removed, to ensure that it has not been displaced or migrated.

If you choose to participate you will receive the same medical treatment that you would if you were not participating, with the exception that intensive surveillance of VTE will not occur for patients who are not enrolled in the study.

## 1 Possible benefits and risks.

All participants who are enrolled in this trial will receive an intensive surveillance for VTE, in the form of an ultrasound scan to their lower limbs at 2 weeks after injury, and a proactive approach to detect pulmonary embolism. The standard methods to detect pulmonary embolism include a CT pulmonary angiography, high probability ventilation/ perfusion scan or trans-oesophageal echocardiogram – which are commonly used in hospitalised patients who are suspected to have pulmonary embolism. We expect this trial will detect all forms of VTE at a much earlier stage than in the usual clinical situation for patients who are not enrolled in the trial due to the proactive approach to detect pulmonary embolism according to the trial protocol. Early detection of VTE will benefit patients in the trial because appropriate therapy can be initiated earlier to prevent the progression of the disease.

For participants who are randomized to receive an IVCF, it is possible that they may experience a lower incidence of symptomatic pulmonary embolism as an additional benefit of being in the trial if they are not in the trial when an IVCF is not used.

IVCF is not an experimental treatment and is currently used on a regular basis in many patients worldwide. Although an IVCF may have benefits, it always has some potential risks. Complications of an IVCF include, but are not limited to, erosion of the inferior vena cava, developing a thrombus (blood clot) above or below the IVCF, migration of the filter to the right atrium of the heart, tilting or mal-positioning of the filter resulting in ineffective filtering of emboli, adherent IVCF, fracture of the filter, and risk of bleeding. Any significant side effects experienced by participants of the trial will be addressed according to the standard clinical management procedures, including early removal of the IVCF, similar to when an IVCF is used for patients not enrolled in the trial. For participants with IVCFs not removed due to mechanical complications (i.e. adherent filters), they will be followed up every 6 months until the end of the study or longer if clinically indicated. All participants will also be followed up for all medical problems, which may or may not be related to an IVCF, until January 2018 by linkage of their health data to the WA Department of Health Data Linkage Unit databases.

For patients who are randomized to the traditional way of preventing VTE, they will not experience the potential complications of an IVCF, unless the attending clinicians decide that an IVF is still clinically indicated at a later stage. It is possible that those participants that don't receive an IVC filter may experience a higher risk of pulmonary embolism if IVCFs are proved to be effective in reducing PE. All participants will also be followed up for all medical problems, which may or may not be related to an IVCF, until January 2018 by linkage of their health data to the WA Department of Health Data Linkage Unit databases.

Whether or not you participate in this trial you will not affect the way you are managed in the Intensive Care Unit or the State Major Trauma Unit and you have the right to withdraw from the trial at any time after enrolment into the trial. If you are enrolled in the trial to receive an IVCF, a separate informed clinical consent for this procedure will be obtained and you have the right to not consent for this procedure even though you have consented to be enrolled in this trial.

**What if something goes wrong?**

In the event that you suffer an adverse event or a medical accident during this trial that arises from your participation in the trial, you will be offered all full and necessary treatment by RPH. The Ethics Committee has approved this trial on the basis (amongst others) that the reported risk of such an event is either small or acceptable in terms of the risk you face as a result of your current injuries or the benefit that is possible with the new treatment being tested. No provisions have been made in this trial to offer trial subjects who suffer an adverse reaction monetary compensation, but the absence of such a provision does not remove your rights to seek compensation under common law.

## 2 Confidentiality and privacy

The information gathered about you by the Investigators or obtained during the trial will be held by the investigators in strict confidence. Clinical information will be stored securely on-site at Royal Perth Hospital in a locked filing cabinet inside a locked office or on computer where access is password protected. Only research personnel associated with the trial or members of the Ethics Committee who wish to review trial procedures will have access to this information. Your trial records **without your name attached** will be made available to the trial management committees and through them may be made available to government regulatory bodies in Australia and overseas. All the people who handle your information will adhere to traditional standards of confidentiality and will also comply with all relevant privacy legislation. In Australia this is the Privacy Act 1988. The Ethics Committee has obtained assurances from the research team that the 'Information Privacy Principles' laid down in the Act will be met, and will oblige the Investigator and other hospital staff to meet strict privacy standards. If the results of the trial are published in a medical journal, as is intended, no reader will be able to identify individual patients.

**Voluntary participation**

You do not have to participate in this trial. Participation in this trial is entirely voluntary and if you agree to participate you may withdraw from the trial at any time without it affecting your medical treatment.

Your participation in this trial may be ended without your consent by the doctor if the doctor that is treating you decides to end the trial for other reasons.

**Contacts for questions or further information**

Further information may be obtained from the Principal Investigator Dr K.M. Ho, ICU, on (08) 9224 2601

This trial has been approved by the Royal Perth Hospital Ethics Committee. If you have any concerns about the conduct of the trial or your rights as a research participant, please contact Prof Frank van Bockxmeer, Chairman of the RPH Ethics Committee, via (08) 9224 2292 or rph.hrec@health.wa.gov.au and quote the ethics approval number (ECXXX).

Patient Label


Royal Perth Hospital

# Consent Form

**Detailed assessment of risks and benefits of inferior vena cava filters on patients with complicated injuries (the Da Vinci Trial)**

**Principal Investigator:** Clin. A/Prof Kwok M. Ho, Intensive Care Unit RPH

By signing the following consent form, you authorise as described above the recording, review, information storage and data transfer of information collected during the trial pertaining to you, including long-term follow-up of your health conditions through the WA Department of Health Data Linkage Unit. Your signature indicates you have read and that you understand the above information, that you have discussed this trial with the person obtaining consent, and that you have consented to participate based in the information provided. A signed and dated copy of this form will be given to you.

If you are enrolled in the trial to receive an IVCF, a separate informed clinical consent for this procedure will be obtained and you have the right to not consent for this procedure even though you have consented to be enrolled in this trial.

Signature of Participant Date Time

_____

Printed Name of Participant _____

Signature of Investigator Obtaining Consent Date Time

_____

Printed Name of Investigator: _____

**One copy to be given to participant, one copy filed in the participant's medical record**

Patient Label


Royal Perth Hospital

# Next-of-Kin Information Sheet

**Detailed assessment of risks and benefits of inferior vena cava filters on patients with complicated injuries (the Da Vinci Trial)**

**Principal Investigator:** Clin. A/Prof Kwok M. Ho, Intensive Care Unit RPH

The RPH Intensive Care Unit (ICU) and the State Major Trauma Unit is conducting a **research trial** that involves patients who experience a major trauma. Patients who are admitted following a major trauma are critically ill and may require other life support treatment rendering them unable to provide consent for this trial.

The RPH Ethics Committee has approved this trial and allowed the Next-of-Kin of the patients to acknowledge that they believe their family member (or the patient) would have consented for enrolment in this study should they be competent to do so. The Ethics Committee has done this because (i) it considers this research is asking a clinically important question that has no evidence to guide clinical practice and (ii) many patients under the study condition of this trial would not be able to give their consent directly and (iii) if your Next-of-Kin are enrolled in the trial to receive an IVCF, a separate informed clinical consent will be obtained from you and you have the right to not consent on behalf of your Next-of-Kin for this procedure even though you have acknowledged for your Next-of-Kin to be enrolled in this trial, after knowing the fact that IVCF is often used in this situation and the potential benefits and risks of this procedure.

**Your Next-of-Kin is eligible to participate in the trial**.

As part of approving the trial with a 'waiver of consent', the Ethics Committee requires that the patient's Next-of-Kin is informed of the trial and acknowledges that they know of no reason why their family member would have objected to participation in the trial had they been asked.

When your Next-of-Kin is well again, we will discuss the trial with them and ask if they agree to continue to participate. The following information is provided to assist you to understand the trial and provide you with an opportunity to tell the Trial Investigator if you know of a reason/s why your family member would have objected to participating in this trial. If you do know of a reason or reasons why they would have objected to participation, they will not be enrolled in the trial.

**Why is this trial being done?**

Venous thromboembolism (VTE) is a significant health problem especially in hospitalised patients. Patients who have suffered major trauma and those that undergo surgery are at the

greatest risk. For most patients, the standard of care is to use blood-thinning medication (prophylactic anticoagulation i.e. heparin) and intermittent pneumatic compression pumps to both lower limbs. However, there is a group of patients who are at very high risk of VTE but blood-thinning medications cannot be used due to risk of bleeding from the blood thinning medications (such as severe brain injury). In these patients, the options are to use no / minimal intervention or to place a filter in the big vein inside the abdomen (also called inferior vena cava) to block the migration of clots from the legs to the lung circulation to prevent pulmonary embolism that can be life-threatening. The current filters that are placed inside the IVC are retrievable when they are no longer needed and are usually called Inferior Vena Cava filters (IVCF). Although IVCFs are widely used for over two decades as a mechanical means to prevent pulmonary embolism in patients who have contraindications to conventional VTE prophylactic measures, their effectiveness in this situation has not been established. Despite the uncertainty about its effectiveness, IVCFs are used for about 50-100 trauma patients who cannot receive blood-thinning drugs to prevent pulmonary embolism every year in Western Australia.

The aim of this trial is to assess the clinical effectiveness, benefits and harms, and also the cost-effectiveness of the early use of IVCF for trauma patients who have contraindications to conventional VTE prophylactic measures (pharmacological VTE prophylaxis and lower limb intermittent pneumatic compression) or such measures are judged to be inadequate to prevent pulmonary embolism (e.g. complicated fractures of the pelvis).

**Why do we think your Next-of-Kin is suitable for this trial?**

Your Next-of-Kin has suffered a major trauma and has been identified as having a significant risk of developing a venous thromboembolism which may result in pulmonary embolism (PE) that can be life-threatening. This is the type of patient we wish to enroll in this trial.

**What will participation in the trial involve?**

Patients who participate in this trial will be randomly separated into two groups (50% of the participants in each group). The first group of patients will be managed using a traditional way of preventing VTE. For patients who can receive mechanical DVT prophylaxis in the form of lower limb compression devices, they will receive this means of DVT prevention to the leg that is not injured. Blood thinning drugs, such as heparin, that are commonly used to prevent DVT will be started at the discretion of the attending clinicians. The trial recommends blood-thinning medications, such as heparin, within 7 days of injury. Because this trial only considers patients who have contraindications to blood thinning drugs in the initial phase after their injuries, we expect the attending clinicians will not start the blood thinning drugs within the first three days, and in some cases, could be much later.

The second group of patients, who have similar injuries as the first group, will receive an IVCF within the first 72 hours of injury as a means to prevent pulmonary embolism. The other treatments will be exactly the same as the first group of patients. All IVCFs will be removed before the patient is discharged from hospital or 90 days after the trauma, unless the treating doctor believes the IVC filter should be left in for longer. All patients who have received an IVCF will have an abdominal x-ray before being discharged from hospital to make sure that either the IVCF has been removed entirely or, if it has not been removed, to ensure that it has not been displaced or migrated.

If you choose to allow your Next-of-Kin to participate, he/she will receive the same medical treatment that they would if they were not participating, with the exception that intensive surveillance of VTE will not occur for patients who are not enrolled in the study.

**What information will be collected about my Next-of-Kin?**
Information collected during the trial about your Next of Kin will include:

- Personal information will include age, gender, and race
- Severity and location of injuries
- Previous medical history & other chronic health conditions (e.g. diabetes mellitus)
- Medications prior to injury
- Interventions and investigations conducted during the entire hospital stay
- Surgical interventions
- Any complications up to 12 months after study enrolment by linkage to WA Department of Health databases

Information for the trial about your Next-of-Kin will entered into an electronic Case Report Form (eCRF) on a computer.

**Who will see my Next-of-Kin's medical and personal information?**
The information gathered about your Next-of-Kin during the trial by the study team, will be held in strict confidence. To protect your Next-of-Kin's privacy, their records will be identified with a code. Any information that identifies your Next-of-Kin, such as their name, that links them to these records will be known only to the Investigator, Dr KM Ho and the information will be stored in a secure password protected computer. All the people who handle your Next-of-Kin's information will adhere to all relevant privacy legislation. In Australia this is the Privacy Act 1988. If the results of the trial are published in a medical journal, as may be intended, no reader will be able to identify individual patients.

**What are the potential benefits and risks to my Next-of-Kin if they participate in this trial?**

All participants who are enrolled in this trial will receive an intensive surveillance for VTE, in the form of an ultrasound scan to their lower limbs at 2 weeks after the injury, and a proactive approach to detect pulmonary embolism. The standard methods to detect pulmonary embolism include a CT pulmonary angiography, high probability ventilation/ perfusion scan or trans-oesophageal echocardiogram – which are commonly used in hospitalised patients who are suspected to have pulmonary embolism. We expect this trial will detect all forms of VTE at a much earlier stage than in the usual clinical situation for patients who are not enrolled in the trial. Early detection of VTE will benefit patients in the trial because appropriate therapy can be initiated earlier to prevent the progression of the disease.

For participants who are randomized to receive an IVCF, it is possible that they may experience a lower incidence of symptomatic pulmonary embolism as an additional benefit of being in the trial if they are not in the trial when an IVCF is not used.

IVCF is not an experimental treatment and is currently used on a regular basis in many patients worldwide. Although an IVCF may have benefits, it always has some potential risks. Complications of an IVCF include, but are not limited to, erosion of the inferior vena cava, developing a thrombus (blood clot) above or below the IVCF, migration of the filter to the right atrium of the heart, tilting or mal-positioning of the filter resulting in ineffective filtering of emboli, adherent IVCF, fracture of the filter, and risk of bleeding. Any significant side effects

experienced by participants of the trial will be addressed according to the standard clinical management procedures, including early removal of the IVCF, similar to when an IVCF is used for patients not enrolled in the trial. For participants with an IVC filter that is not removed due to mechanical complications (i.e. adherent filters), they will be followed up every 6 months until the end of the study, or longer if clinically indicated. All participants will also be followed up for all medical problems, which may or may not be related to an IVCF, until January 2018 by linkage of their health data to the WA Department of Health Data Linkage Unit databases.

For patients who are randomized to the traditional way of preventing VTE, they will not experience the potential complications of an IVCF, unless the attending clinicians decide that an IVF is still clinically indicated at a later stage. It is possible that those participants that don't receive an IVCF may experience a higher risk of pulmonary embolism if IVCFs are proved to be effective in reducing PE. All participants will also be followed up for all medical problems, which may or may not be related to an IVCF, until January 2018 by linkage of their health data to the WA Department of Health Data Linkage Unit databases.

Whether or not your Next-of-Kin participate in this trial it will not affect the way your Next-of-Kin are managed in the Intensive Care Unit or the State Major Trauma Unit and you have the right to withdraw your Next-of-Kin from the trial at any time after enrolment into the trial. If your Next-of-Kin is enrolled in the trial to receive an IVCF, a separate informed clinical consent for this procedure will be obtained from you and you have the right to not consent for this procedure even though you have acknowledged allowing him/her to be enrolled in this trial.

**Your Next-of-Kin's participation**

In the event that your family member's health improves and they regain the capacity to provide consent we will approach them for consent to confirm their participation in the trial. Whatever you decide, your Next-of-Kin will continue to receive the best medical care currently available to which they are entitled.

**Contacts for questions or further information**

Further information may be obtained from the Principal Investigator Dr K.M. Ho, ICU, on (08) 9224 2601

This trial has been approved by the Royal Perth Hospital Ethics Committee. If you have any concerns about the conduct of the trial or the rights of your Next of Kin, please contact Prof Frank van Bockxmeer, Chairman of the RPH Ethics Committee, via (08) 9224 2292 or rph.hrec@health.wa.gov.au and quote the ethics approval number (ECXXX).

Patient Label

**Royal Perth Hospital**

# Next-of-Kin Acknowledgement Form

**Detailed assessment of risks and benefits of inferior vena cava filters on patients with complicated injuries (the Da Vinci Trial)**

**Principal Investigator:** Clin. A/Prof Kwok M. Ho, Intensive Care Unit RPH

Participant's Full Name (please print): _____

Name of Next-of-Kin: _____

Relationship to Participant: _____

By signing this form, I acknowledge all of the following:

- I have read the Next-of-Kin Information Sheet and had the trial explained to me regarding what will be done and what I am being asked to do. I have had the opportunity to ask questions, and I understand that I may ask additional questions about this trial at any time.
- I understand that the RPH Ethics Committee has approved this trial and that, as such, I am not being asked to consent to my family member's participation, but to acknowledge that I know of no reason my family member would have objected to participating in the trial. If my Next-of-Kin is enrolled in the trial to receive an IVCF, a separate informed clinical consent for this procedure will be obtained from me and I have the right to not consent for this procedure even though I have acknowledged allowing him/her to be enrolled in this trial.
- I am not aware of any reason/s why my family member would have objected to participation in this trial.
- I understand that in the event of my family member regaining the capacity to consent that they will be fully informed of the trial and will then be asked to provide consent for continued participation.
- I understand I will be given a copy of the Next-of-Kin Information Sheet and this signed Acknowledgment Form to keep for my and my Next-of-Kin's reference.
- I acknowledge that my Next-of-Kin's confidential and personal information held by the Investigator and Study Team at RPH, will be made available for review by any health authorities, institutions, or governmental agencies assigned this task in this country or, if applicable, the Ethics Committee.

_____

**Signature of Next-of-Kin** **Print Name** **Date** **Time**

**Statement of Investigator or person designated to obtain Informed acknowledgment:**

I have explained the nature and purpose of this trial, and the potential benefits and reasonably foreseeable risks associated with participation, to the Next-of-Kin on the date noted I have answered any questions that were raised, and have witnessed the above signature

_____

**Signature of Investigator** **Print Name** **Date** **Time**

Patient Label

Royal Perth Hospital

# Consent Form - For Continued Participation

**Detailed assessment of risks and benefits of inferior vena cava filters on patients with complicated injuries (the Da Vinci Trial)**

**Principal Investigator:** Clin. A/Prof Kwok M. Ho, Intensive Care Unit RPH

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**Participant Name:** ..... **Study Number:** .....

You have been enrolled in the above trial granted by the RPH Ethics Committee and with the acknowledgement of your Next-of-Kin. This occurred when you were not able to make your own decision due to your injuries. Now you are better, we are inviting you to continue to be in this trial.

As explained in the Participant Information Sheet, this is a research trial that involves patients who have experienced a major trauma and are at significant risk for developing venous thromboembolism (VTE). The decision is up to you. You may wish to discuss this with your family.

The research team from the Intensive Care Unit and State Major Trauma Unit are available to answer any questions about any part of this trial that is not clear to you.

- I understand the information in the Participant Information Sheet.
- I understand that my decision to continue participation or not, WILL NOT jeopardize any treatment or my relationship with Royal Perth Hospital.
- Please indicate your decision by checking (ticking) one of the two boxes below:
  □ **I agree to continue being in the trial**, specifically for the data collected from my involvement in the trial to be used by the Investigator.

□ **I do not agree to continue in the trial**

- I give my consent to be followed up by the research team up until January 2018.

- I understand I will be given a copy of the Participant Information Sheet and this document to keep.

_____

| **Signature of Patient** | **Please PRINT name** | **Date** | **Time** |
|---|---|---|---|

_____

| **Signature of Investigator** | **Please PRINT name** | **Date** | **Time** |
|---|---|---|---|