

Jehovah's Witnesses and Those Who Refuse Blood Transfusion

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The management of postpartum hemorrhage (PPH) is particularly challenging when a pregnant woman refuses transfusion of primary blood products for religious or personal reasons. This chapter outlines strategies and techniques that can be used in such a situation or when the blood supply is limited or unsafe because of lack of testing (see Addendum A)¹.

INTRODUCTION

According to World Health Organization (WHO), approximately 92 million blood donations are collected every year². Of these, 50% take place in low- and middle-resource countries where 85% of the world's population lives². In many such nations, blood is not available for treatment of PPH (or anything else, for that matter) because effective blood collection programs do not exist³. According to WHO, donated blood 'should always be screened for HIV, hepatitis B, hepatitis C and syphilis prior to transfusion, but in 39 countries (out of 164 reporting in 2008), not all donated blood is tested for one or more of these infections. Testing is not reliable in other countries because of staff shortages, poor quality test kits, irregular supplies, or lack of basic laboratory services'⁴.

Even in middle- and high-resource countries, where donated blood is screened for these conditions, patients are concerned about the transmission of variant Creutzfeld-Jakob disease (vCJD) as well as other side-effects such as transfusion related acute lung injury (TRALI), transfusion related immunomodulation (TRIM) and the administration of the wrong blood to the wrong patient. A 2002 survey in the UK of 228 pregnant women determined that 8% of respondents would not accept a blood transfusion for either religious reasons (4%) or no stated reason (4%)⁵. Regardless of the patient's preferences, the cost of a transfusion is significant. A 2010 investigation into the actual cost of blood in surgical patients found that when direct and indirect costs were included, costs per red blood cell unit varied between \$522 and \$1183⁶.

Prominent among those individuals refusing transfusion of primary blood components are members of the Jehovah's Witness faith. A growing number of physicians and surgeons have developed techniques

and strategies for providing appropriate medical and surgical management for members of this group without the use of blood. These techniques and strategies can also be adopted in situations where there are acute blood shortages or where the blood supply is not tested for HIV, hepatitis B, hepatitis C and syphilis.

As many readers of this volume do not understand why Jehovah's Witnesses refuse the transfusion of primary blood components, this chapter begins with a discussion of this topic and proceeds to describe an overview of how PPH may be avoided or treated in this group.

JEHOVAH'S WITNESSES AND THEIR VIEW OF MEDICINE AND BLOOD

Modern day Jehovah's Witnesses descend from an informal Bible Study Group that began in Allegheny, Pennsylvania, USA, in the early 1870s. The aim of the group was to try, by means of Bible study, to determine the original teachings of Jesus Christ and the first century Christians, unfettered by the traditions and teachings of other denominations. The results of their deliberations were eventually published in *Zion's Watch Tower and Herald of Christ's Presence*, the first issue of which appeared in July 1879. In 1881, the Zion's Watch Tower Tract Society was formed. Ultimately, the Society's name was changed to The Watch Tower Bible and Tract Society, but it did not adopt its present title, 'Jehovah's Witnesses', until 1931.

Jehovah's Witnesses believe that the Bible is the inspired Word of God, accepting both the Old and New Testaments. During the First World War, the practice of blood transfusion became established. The 1 July 1945 issue of *The Watchtower* magazine⁷ advised Jehovah's Witnesses that this practice was contrary to scriptural passages such as:

'Everything that lives and moves will be food for you. Just as I gave you the green plants, I now give you everything. But you must not eat meat that has its lifeblood still in it.' *New International Bible, Genesis 9:3-4*

'... because the life of every creature is its blood. That is why I have said to the Israelites, "You must not eat the blood of any creature, because the life of every creature is its blood;

anyone who eats it must be cut off.'" *New International Bible, Leviticus 17:14*

'It seemed good to the Holy Spirit and to us not to burden you with anything beyond the following requirements: You are to abstain from food sacrificed to idols, from blood, from the meat of strangled animals and from sexual immorality. You will do well to avoid these things.' *New International Bible, Acts 15:28-29*

Jehovah's Witnesses are not antimedicine or anti-surgery; many are doctors and nurses. They view life as sacred and as a gift from God and therefore seek medical attention for themselves and their families. Their stance on medical/surgical treatment is summarized in Table 1. Although Jehovah's Witnesses refuse blood components, plasma derivatives are a matter of personal choice. Table 2 summarizes the Witness position in these areas.

In the final analysis, the decision to abstain from blood transfusion is a personal one and not, as commonly portrayed, a dictate from the world headquarters in the USA. The depth of belief of each individual Witness is well summarized in the booklet *Management of Anaesthesia for Jehovah's Witnesses*, published by the Association of Anaesthetists of Great Britain and Ireland: 'Administration of blood to a competent patient, against their will and in conflict with their genuinely held beliefs, has been likened by the Witnesses to rape. It will not result in expulsion from the community if it was carried out against the expressed wishes of the patient but may have as deep a psychological effect as forceful sexual interference'⁸.

In the UK, the General Medical Council has issued guidance about personal beliefs of patients with special reference to the treatment of Jehovah's Witnesses⁹: 'You should not make assumptions about the decisions that a Jehovah's Witness patient might make about treatment with blood or blood products. You should

ask for and respect their views and answer their questions honestly and to the best of your ability. You may also wish to contact the hospital liaison committees established by the Watch Tower Society (the governing body of Jehovah's Witnesses) to support Jehovah's Witnesses faced with treatment decisions involving blood. These committees can advise on current Society policy regarding the acceptability or otherwise of particular blood products. They also keep details of hospitals and doctors who are experienced in 'bloodless' medical procedures.'

ARE PREGNANT JEHOVAH'S WITNESSES AT HIGHER RISK OF MORTALITY AND MORBIDITY?

Although several studies describe the risks of refusal of primary blood components in major surgery and trauma¹⁰⁻¹², the data estimating the increased risk due to PPH in Jehovah's Witnesses are limited. Mostafa *et al.*¹³ in 1982 concluded that 'major operative procedures can be carried out on Jehovah's Witness patients without blood transfusions or blood products.' However, these authors also stated, 'The most dreaded problem a Jehovah's Witness could face is a hemorrhagic complication of pregnancy. Specifically, severe disseminated intravascular coagulation, placental abruption, or placenta accreta often results in substantial blood loss that is unmanageable without transfusions. When these complications arise, little can be done with currently available blood substitutes.'

A 2001 study by Singla *et al.*¹⁴ concluded that 'Women who are Jehovah's Witnesses are at a 44-fold increased risk of maternal death, which is due to obstetric hemorrhage.' Massiah *et al.*¹⁵ in 2007 published a study of 116 deliveries over a period of 14 years amongst Jehovah's Witnesses and reported one maternal death due to PPH, leading them to conclude that there was a 65-fold increase of maternal death amongst this cohort of patients. A more recent (2009) study from The Netherlands¹⁶ concluded that: 'Women who are Jehovah's Witnesses are at a six times increased risk for maternal death, at a 130 times increased risk for maternal death because of major obstetric hemorrhage and at a 3.1 times increased risk for serious maternal morbidity because of obstetric hemorrhage, compared to the general Dutch population.' A comparison of these three studies is shown in Table 3.

In the UK, statistics on PPH are collected and published triennially by the Centre for Maternal and Child Enquiries (CMACE). The report for 2000-2002 identified ten deaths due to PPH; two were in women who declined blood transfusion¹⁷. Commenting on these deaths, the report stated: 'Both were delivered by elective section, for reasons which were not clearly documented, and both subsequently required hysterectomy. Delay in carrying out the subsequent hysterectomy in one case may have been due to difficulty in obtaining consent.' The report continued: 'There have only been six cases of death in women refusing blood transfusion in the last 21 years (1982-2002), so

Table 1 The Jehovah's Witness position on medical treatment

Accept all forms of medical treatment except blood transfusions
Are not exercising a right to die
Are keen to cooperate with medical professionals

Table 2 The Jehovah's Witness position on blood

<i>Unacceptable</i>
Whole blood
Red cells
White cells
Platelets
Plasma (fresh frozen plasma)
Preoperative autologous donation (PAD)
<i>Personal choice</i>
Derivatives from red cells
Derivatives from white cells (e.g. interferons)
Derivatives from platelets (e.g. autologous platelet gel or glue)
Derivatives from plasma
Fibrin glues/sealants
Clotting factors
Prothrombin complex concentrates
Immunoglobulins (e.g. anti-D)

Table 3 Comparison of studies reporting morbidity and mortality rate in Jehovah's Witness patients

	<i>Singla et al.</i> ¹⁴	<i>Massiah et al.</i> ¹⁵	<i>Van Wolfswinkel et al.</i> ¹⁶
No. of deliveries	391	116	8850 (estimated)
% Cesarean section	16%	24%	Not given
No deaths	2	1	6 (3 substandard care)
% PPH	6%	6%	Not given
Increased risk of maternal death	44 fold	65 fold	130 fold

it is a very uncommon event, although it may well be that those women are over-represented among deaths.'

The Eighth Report of the Confidential Enquiries into Maternal Deaths in the United Kingdom reports five deaths due to PPH during the period 2006–2008, one of which occurred in a woman refusing blood transfusion¹⁸.

Even with the paucity of data regarding the increased risk of mortality and morbidity during pregnancy, Jehovah's Witnesses accept the fact that obstetricians and midwives classify them as high risk. As a result, they seek to be as cooperative as possible in minimizing the consequences that their conscientiously held beliefs impose.

MANAGING THE JEHOVAH'S WITNESS IN THE ANTENATAL PERIOD

Pregnant Jehovah's Witnesses are encouraged to make their position on blood transfusion known early during their antenatal visits. This is in harmony with the recommendation of the 2003–2005 Confidential Enquiry into Maternal and Child Health report *Saving Mothers' Lives*¹⁹, which says with respect to those who refuse blood transfusion: 'Consultant obstetric and anaesthetic involvement is necessary during the antenatal period in order to develop a care plan together with the woman, her husband and family, and, if necessary, religious advisors, should any difficulty occur.' In some countries, the patient will bring a copy of *Care Plan for Women in Labor Refusing a Blood Transfusion*²⁰ as the basis for discussion and the formulation of a treatment plan Addendum B.

Blood samples should be taken and checked for anemia and any coagulation abnormalities. Correction of anemia can be accomplished by the use of oral or intravenous iron^{21–23}, folic acid, vitamin B₁₂ and erythropoietin²⁴. Hemoglobin (Hb) levels should be monitored monthly throughout the pregnancy. Although oral iron is prescribed to most pregnant women, a not insignificant proportion of women arrive at term with a Hb level of less than 10 g/dl. A Hb level of 11 g/dl in the first and third trimesters, and 10.5 g/dl in the second, is often regarded as the lowest

acceptable level during pregnancy. A Hb level of less than 10.5 g/dl is considered anemia²⁵. For women who will refuse blood transfusion, it is appropriate to maintain Hb at a target level of 12 g/dl or higher.

Coagulation abnormalities should be investigated and corrected wherever possible. A review of all medications that the patient may be taking including non-steroidal anti-inflammatory drugs (NSAIDs), warfarin, antibiotics, etc. should be undertaken. Where there may be a risk of a thromboembolic event if anticoagulants are withdrawn, these should be changed for agents with a shorter half-life, such as low molecular weight heparin, allowing for perioperative correction in the event of hemorrhage. Where indicated, the administration of vitamin K should be considered. During the antenatal period, it is important to ascertain the woman's views on intraoperative cell salvage (ICS), acute normovolemic hemodilution (ANH) and total or subtotal hysterectomy.

As previously mentioned, Jehovah's Witnesses have differing, albeit conscientiously held views about the use of plasma derivatives. It is therefore essential that a member of the anesthetic team meets with the patient during the antenatal period to ascertain whether cryoprecipitate, fibrin glues and sealants, prothrombin complex concentrate or other clotting factors would be acceptable in the event of major hemorrhage⁸. (A suggested checklist for this purpose also is included in the Addendum C.)

During late pregnancy ultrasound should be used to determine the location of the placental site in order to ascertain whether there is the risk of placenta previa or accreta so that strategies may be formulated for delivery by high-risk cesarean section.

Jehovah's Witnesses are encouraged to complete an advance decision document²⁶ or durable power of attorney (DPA) declining the administration of blood and blood products. The document also serves as a release for the hospital and obstetric team in the event that the woman dies. An example of such a document is shown in Addendum D. The woman also may wish to wear a 'no blood' wristband to make it clear to all members of the care team that blood transfusion is not to be used²⁶.

MANAGING THE JEHOVAH'S WITNESS IN LABOR

The Annexe to the 2002 CEMACH report¹⁷ recommends: 'The consultant obstetrician and anaesthetist should be informed when a woman who will decline transfusion is admitted in labour or for delivery. Vaginal delivery is usually associated with lower blood loss than caesarean section, and caesarean section should be performed only if there is a clear medical indication. In that case it should be performed by a consultant obstetrician.'

The third stage of labor should be actively managed using intramuscular or intravenous oxytocin with the delivery of the anterior shoulder and slow delivery of the posterior shoulder and body²⁷. The placenta should be delivered using controlled cord traction,

while displacing the uterus upwards by suprapubic pressure²⁸. The placenta should be checked for completeness and the uterus inspected for any retained products of conception or trauma. The prophylactic administration of Syntometrine[®] marginally decreases the risk of PPH compared with oxytocin alone²⁹. At the completion of the delivery, the obstetrician should arrange for close observation, uterine palpation, assessment of bleeding and monitoring vital signs for at least 1 hour.

MANAGING THE HEMORRHAGING JEHOVAH'S WITNESS

In the event of PPH, obstetric, anesthetic and hematology consultants should be immediately involved. Colloid such as Gelofusine[®] or Haemacel[®] should be infused using two large bore needles. However, in the actively bleeding patient, aggressive fluid resuscitation may inhibit hemostasis, disrupt clot stability or exacerbate hemorrhage as well as dilute coagulation factors. Published data suggest that adequate tissue oxygenation can be maintained by moderate under-resuscitation and mild hypotension³⁰.

After administering uterotonic agents and ensuring that retained products of conception or trauma are not the cause of the bleeding, it is appropriate to proceed with bimanual uterine compression. Oxygen should be administered; 100% oxygen has been shown to improve systemic oxygen transport³¹. An indwelling catheter allows monitoring of urine output. Insertion of a central venous pressure (CVP) line may be of value in certain patients, and aortic compression against the spine, using a fist just above the umbilicus, may buy time in an emergency.

PROMOTION OF HEMOSTASIS

In addition to the administration of drugs to correct uterine atony, the use of specific hemostatic agents may also be effective in the management of PPH. The antifibrinolytic agent tranexamic acid controls hemorrhage in a number of situations, including PPH^{32–34}. The use of recombinant factor VIIa (rFVIIa; NovoSeven[®]) to arrest uncontrolled hemorrhage is well described in Chapter 50 of this volume. A 2010 paper by Franchini *et al.*³⁵ contains a useful flow diagram for the administration of factor VIIa (Figure 1) and recommends an initial intravenous bolus of 90 µg/kg over a period of 3–5 min. Because of its expense, the administration of factor VIIa is often recommended as a last resort. However, in the bleeding Jehovah's Witness patient, where the administration of fresh frozen plasma and platelets is not an option, it may be advisable to administer the drug at an earlier stage before the depletion of the clotting factors. Factor VIIa has also been found to be of value in dealing with hemorrhage in placenta accreta/percreta, ruptured uterus and HELLP (hemolysis, elevated liver enzymes, low platelets) syndrome. Consideration should also be given to the intravenous administration of vitamin K.

When a Witness patient indicates during antenatal discussions that she is willing to accept derivatives from blood plasma, therapeutics such as fibrin sealants containing fibrin and thrombin (e.g. Evicel[®] and FloSeal[®]) assist in arresting bleeding³⁶ (see Chapters 57 and 58). Again, where acceptable to the patient, cryoprecipitate, prothrombin complex concentrate may be administered in order to promote coagulation.

SURGICAL AND OTHER INTERVENTIONS

In addition to uterine packing³⁷, intrauterine balloon tamponade has successfully controlled PPH (see Chapters 46–48 and 54)³⁸. Application of the B-Lynch brace suture is a well established, simple, cheap and effective technique for controlling PPH, with a high success rate (see Chapter 51)^{39,40}. The suture can be combined with an intrauterine balloon tamponade if bleeding persists⁴¹. The successful application of the B-Lynch brace suture as a prophylactic measure in a high-risk cesarean section in a Jehovah's Witness patient is also possible⁴².

Where available, radiological embolization of the internal iliac arteries effectively treats active hemorrhage^{37,43} and prophylactic placement of catheters may be considered in cases where there is a high risk of bleeding (see Chapter 49). The same may be said of ligation of the internal iliac artery or bilateral mass ligation of uterine vessels (see Chapters 52 and 53)⁴⁴.

In the event of intractable hemorrhage, then hysterectomy may be the only life-preserving alternative. Subtotal hysterectomy can be quicker and safer (see Chapter 55). The uterine arteries should be clamped as early as possible. The possibility of hysterectomy should have been discussed with the patient during the antenatal period and permission, as a life-saving option, given prior to the onset of labor when there is no question of duress.

The non-pneumatic antishock garment has been successful in the treatment of PPH in that it allows transfer of a patient to a facility with more therapeutic options or buys time till help arrives^{45,46}. This neoprene Velcro-fastened garment can be applied in approximately 2 min and redirects blood from the lower body and abdomen to the vital organs by as much as 0.5–1.5 liters (see Chapters 38 and 39).

USE OF AUTOLOGOUS BLOOD

Intraoperative cell salvage

Many Jehovah's Witness patients are willing to accept intraoperative cell salvage (ICS) if the equipment is set up in such a manner that they can perceive it to be an extension of their own circulatory system. One such set-up, suggested by the UK Cell Salvage Action Group⁴⁷ is shown in Figure 2. Many obstetricians are reluctant to consider cell salvage as an option for fear of the possible risk of amniotic fluid embolism. However, it has been safely used in a large number of cases with separate suction devices, one for the amniotic

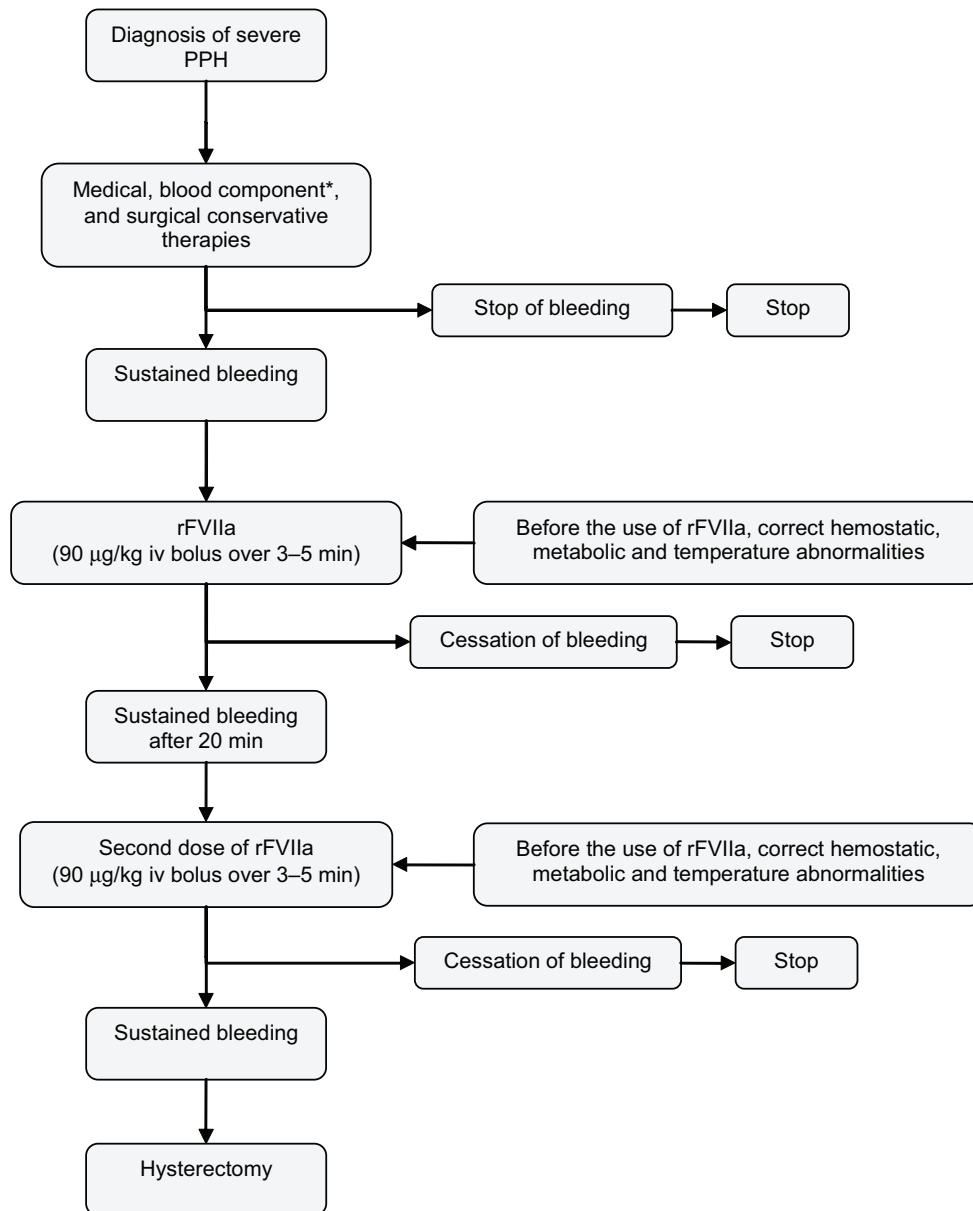


Figure 1 Flow diagram on the potential role of recombinant activated factor VII (rFVIIa) in the treatment of postpartum hemorrhage. *Note blood derivatives should only be used if acceptable to the Jehovah's Witness patient. From Franchini *et al.*³⁵, with permission

fluid and one for blood, with blood returned to the patient via a leucodepletion filter^{48,49}.

Acute normovolemic hemodilution

Acute normovolemic hemodilution (ANH) has been used with success in high-risk situations such as cesarean section for placenta percreta⁵⁰⁻⁵². Hemodilution involves attaching blood bags to the patient and drawing off a calculated volume of blood while replacing it with an asanguinous fluid such as crystalloid or colloid (Figure 2). If bleeding occurs, then effectively, it is diluted blood that is being shed.

The amount of blood that can be drawn off is calculated using the equation⁵³:

$$ABV = \frac{EBV \times (H_o - H_T)}{H_o + H_T} \times 2$$

Where ABV is the autologous blood volume to be withdrawn, H_o the prehemodilution Hb, H_T the target Hb, and EBV the estimated blood volume of the patient.

In the event that ANH is viewed as part of the management plan in a high-risk procedure, then it is essential to optimize antenatal hemoglobin. Although the amount of blood which can be drawn off is limited, it does have the advantage of retaining coagulation factors and platelets which can be returned to the patient. ANH will be acceptable to many Jehovah's Witnesses if the withdrawn blood is left connected to their circulatory system during the procedure. Again, this should be discussed with the patient at the antenatal stage.

Managing postpartum anemia

In the event that a major hemorrhage results in severe anemia, several innovative therapeutic possibilities

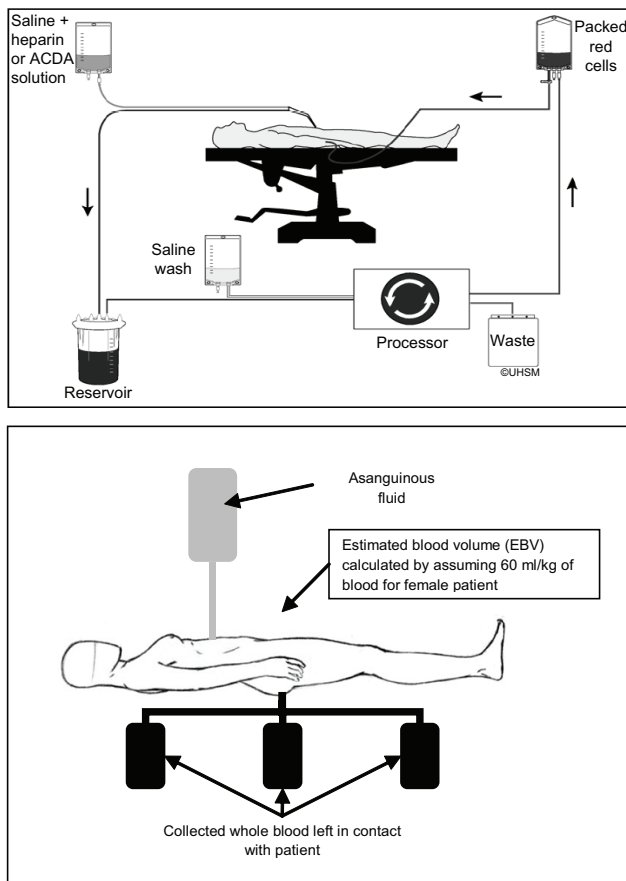


Figure 2 Diagrams illustrating intraoperative cell salvage (upper) and acute normovolemic hemodilution (lower). ACDA, acid citrate dextrose solution A

exist. First, where available, hyperoxic ventilation is more effective in improving tissue oxygenation than red cell transfusions³¹. Second, hematopoiesis can be stimulated using recombinant human erythropoietin (rHuEPO), dosage 300 IU/kg, three times weekly subcutaneously^{54,55}. In order for the EPO to be effective, however, it should be supplemented with IV iron, such as low molecular weight iron sucrose (e.g. Venofer®). Other hematinics such as vitamin B₁₂ and folic acid should also be administered. Oral iron supplementation by itself is slow and unreliable¹⁸. Subsequent patient monitoring should limit blood sampling by phlebotomy with the use of micro-sampling or pediatric techniques. Where available, hyperbaric oxygen therapy has been shown to be effective in the treatment of a Jehovah's Witness patient whose hemoglobin fell to 2.0 g/dl⁵⁶. This is interesting but needs amplification; what else did she get in terms of medication, how long was the treatment and how long did it take for her to recover?

Where problems may arise

The appropriate care of a pregnant woman refusing blood transfusion for religious or other reasons relies heavily on pre-planning and a multidisciplinary approach. Difficulties may arise when someone has

been brought up as a Jehovah's Witness but has then not gone on to follow the faith. Despite this, their personal decision not to have blood products often represents the last vestige of their previous religious conviction to which they still cling. In this event they may well advise the midwife or obstetrician of their refusal to receive blood products when they have actually commenced labor. In order to prevent such a situation, it would be wise to ask all pregnant women on their initial antenatal visit whether they have any objection to transfusion of primary blood products.

SUMMARY

The care of Jehovah's Witnesses and others who refuse blood transfusion requires a multidisciplinary approach, which includes the preparation of a management plan in the event of major PPH.

PRACTICE POINTS

- Antenatally ascertain women's acceptability/refusal of red blood cells/platelet transfusion/plasma derivatives
- Check Hb in last 3 months of pregnancy and correct if necessary
- Plan for active management of third stage of labor
- Plan for B-Lynch suture technique/hysterectomy if all else fails
- Manage postpartum anemia with hyperoxic ventilation/IV iron support.

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Addendum A: Map of Medicine 'Blood transfusion refusal care pathway'

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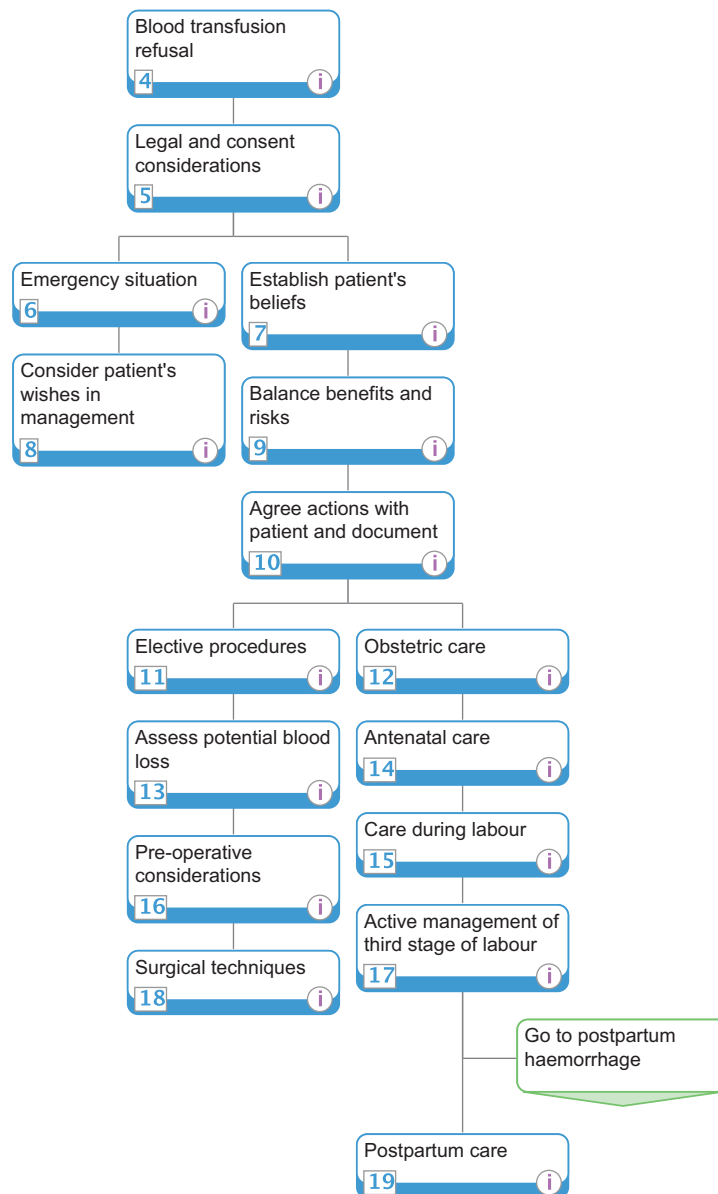
Blood transfusion refusal



http://healthguides.mapofmedicine.com/choices/map/blood_transfusion6.html

i Information
■ Primary care
■ Secondary care

1 Background information i
2 Information resources for patients and carers i
3 Updates to this pathway i



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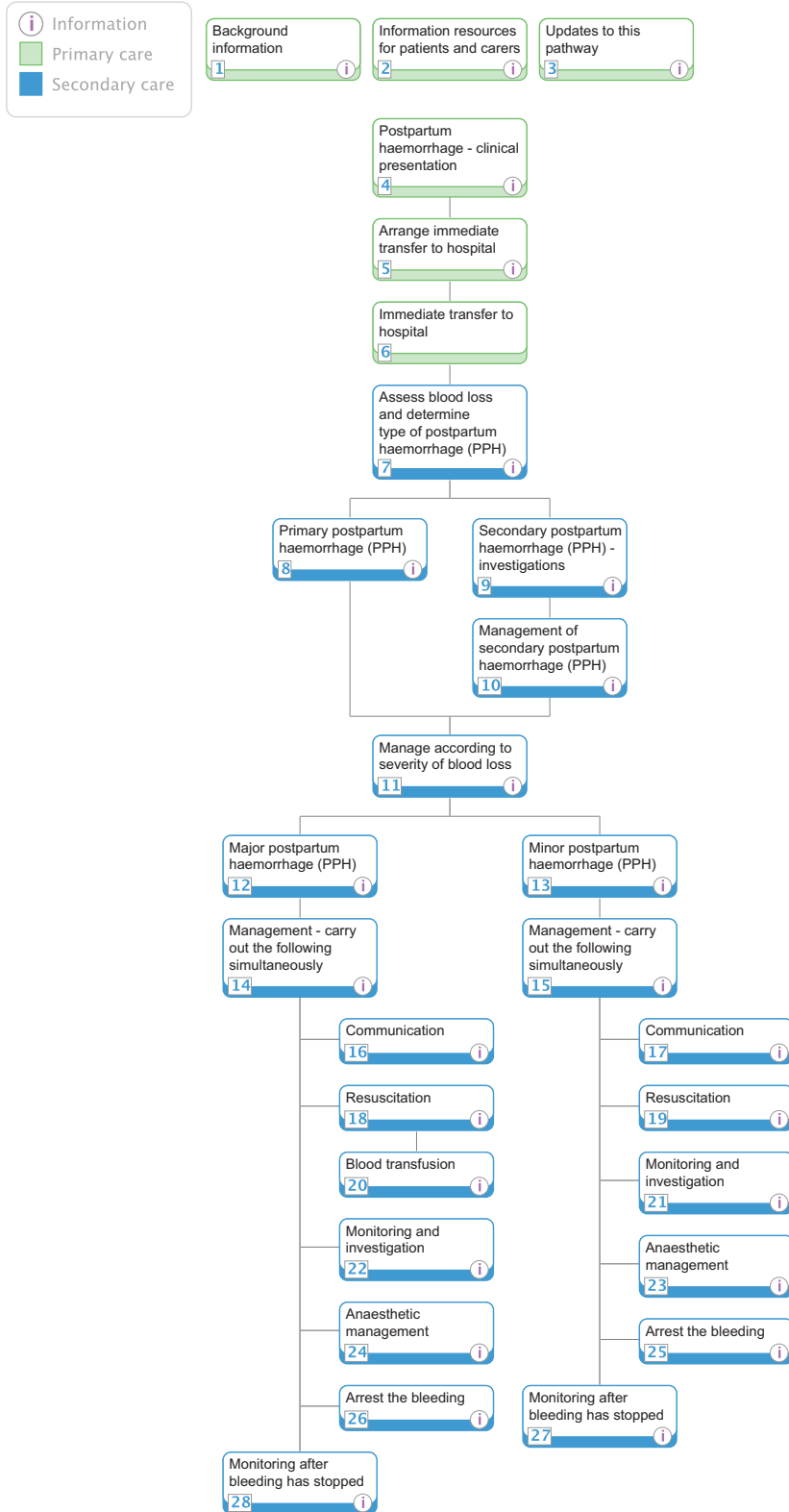
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Postpartum haemorrhage (PPH)



http://healthguides.mapofmedicine.com/choices/map/postpartum_haemorrhage1.html



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Addendum B: Care plan for women in labor refusing a blood transfusion

From Hospital Information Services for Jehovah's Witnesses http://transfusionsguidelines.org/docs/pdfs/bbt-04_care-plan-v2.pdf, with permission

CARE PLAN FOR WOMEN IN LABOUR REFUSING A BLOOD TRANSFUSION

(As referred to in the RCOG News of the Royal College of Obstetricians & Gynaecologists)

This document is an aid for medical staff and midwives managing a Jehovah's Witness or other patient who declines blood. Autologous procedures such as **blood salvage** and the use of **plasma-derived products** such as clotting agents are a **matter of personal choice for each Witness**. Most will carry an advance decision document expressing their wishes. Please check with the patient.

Risk management

- All Jehovah's Witnesses or those declining a blood transfusion should be seen in a consultant clinic.
- Clinicians should **plan in advance for blood loss**. If the Hb is $\leq 10.5\text{g/dl}$ use **ferrous sulphate 200mg tds and folic acid**—with acidic fruit juice or 100mg ascorbic acid to aid absorption. If unresponsive to oral iron, use **IV iron** which replenishes iron stores faster and more effectively than oral iron^{1,2}. A single total-dose IV iron preparation may be more acceptable to the patient than repeat infusions. Addition of **recombinant human erythropoietin (EPO)**, which does not cross the placenta and is reportedly safely used in pregnancy, enhances Hb response^{3,4}.
- High-risk patients should be booked into a unit with **facilities such as interventional radiology, blood salvage and surgical expertise**. All elective surgery must be planned as far ahead as possible.
- For **high-risk caesarean section**, e.g. abnormal placentation, consider with the interventional radiologist elective insertion of catheters for **uterine artery embolisation** immediately pre-operatively and arrange **blood salvage**.
- At the time of labour ensure the **consultant obstetrician and anaesthetist are aware a Jehovah's Witness has been admitted**.
- The **third stage of labour should be actively managed with oxytocics** with consideration of **prophylactic syntocinon** infusion.
- Consider **delayed cord clamping 1-2 min for pre-term infants** to maximise Hb, with controlled cord traction after placental separation⁵.
- Check patient's **vital signs and evidence of uterine contraction** every 15 min for 1 to 2 hours after delivery.
- Contact the **Hospital Liaison Committee for Jehovah's Witnesses in an emergency** (contact details over page).

Management of active haemorrhage

First steps: AVOID DELAY. Involve obstetric, anaesthetic and haematology consultants. Establish IV infusion, along with uterine massage (every 10 min for 1 hour can reduce blood loss⁶). **Give oxytocic drugs first, then exclude retained products of conception or trauma** (this could save time). Proceed with **bimanual uterine compression**. Give oxygen. Catheterise and monitor urine output. Consider CVP line. **Slow, but persistent blood loss requires action**. Anticipate coagulation problems. Keep patient fully informed. Proceed with following strategies if bleeding continues:

Oxytocic agents: Ergometrine with oxytocin (Syntometrine): Marginally more effective than oxytocin alone. If patient is hypertensive, use **oxytocin 10U (not 5U) by slow IV injection** (in serious PPH the benefits of higher dose outweigh the risks)^{7,8}. **Carboprost (Hemabate)** 250µg/ml IM, can be repeated after 15 min. Direct intra-myometrial injection is faster (less hazardous at open operation).

Misoprostol (Cytotec): Useful option in atonic PPH where first-line treatment has failed. Can be given either by **sub-lingual** (600-800µg), **rectal** (800-1000µg) or **intrauterine route** (800µg)^{9,10,11}. Control of haemorrhage reported for rectal and intrauterine routes when unresponsive to oxytocin, ergometrine and carboprost^{10,11}.

Intrauterine balloon tamponade: Have available purpose-designed 500 ml **Bakri tamponade balloon** (Cookmedical). Drainage of blood and cessation of bleeding can be observed via the catheter drainage shaft. Continue oxytocin. Expulsion of balloon can be prevented by vaginal packing. To minimise bleeding risk during removal, use graduated deflation or slowly deflate to half volume and observe; if no bleeding, continue deflation; if bleeding starts, reinflate^{12,13}. Alternatively, stomach balloon of **Sengstaken-Blakemore oesophageal catheter** has controlled haemorrhage in 84% of 43 cases (in 2 studies), in the majority of successful cases bleeding was due to uterine atony^{12,14}. Distal end of tube beyond balloon should be cut off to reduce risk of occlusion or perforation. Indwell time of balloon averaged 24 hours¹⁴. **Bakri balloon also used to control PPH due to vaginal lacerations**¹⁵.

Non-inflatable anti-shock garment: Recently developed neoprene Velcro-fastened garment (zoexniasg.com) can be applied in 2 minutes and allows perineal access for obstetric procedures. Can reduce blood loss and reverse hypovolaemic shock within minutes by the transfer of 0.5 to 1.5 litres of blood from the lower body and abdomen to the vital organs. This can stabilise the patient and gain time while awaiting senior staff input. Successful trials have been conducted with >400 women experiencing PPH in developing countries¹⁶.

Recombinant factor VIIa (NovoSeven): Increasing evidence of effectiveness for control of PPH unresponsive to standard therapies. This product and the following haemostatic agents should be used under consultant guidance. 90 µg/kg provide site-specific thrombin generation, repeat if unresponsive. Successfully used to stop or reduce bleeding in 88% of 118 massive PPH cases¹⁷. Also to control bleeding in 17 anecdotal PPH cases complicated by DIC¹⁸. (Novo Nordisk have 24-hour emergency distribution for UK-wide delivery [01889 565652] or a small stock can be held to avoid delivery delay.) Occasional failure of FVIIa has been attributed to a low fibrinogen level¹⁹. The **fibrinogen concentrate Haemocomplettan** (a plasma-derived **alternative to cryoprecipitate**; available on a named-patient basis within 24 hours from CSL Behring; 01444 447400) can enhance clot strength and normalise clotting in the presence of FVIIa^{20,21}.

Other haemostatic agents: Prothrombin complex concentrates (PCCs) such as **Beriplex** and **Octaplex** (plasma-derived), are proposed as substitutes for fresh frozen plasma and are widely prescribed as such in Europe. Beriplex reported to achieve control of bleeding in cardiac and other surgery²². **Tranexamic acid (Cyklokapron):** anti-fibrinolytic agent well established for controlling haemorrhage, use 1gm IV x tds, slowly²³. **Fibrin sealants: Flowseal** used to arrest massive bleeding in surgical bed following hysterectomy²⁴; **Tisseel** has controlled bleeding of complicated vulval and vaginal lacerations when suture haemostasis failed due to tissue friability²⁵. Also consider IV **vitamin K**.

B-Lynch uterine compression suture: The B-Lynch brace suture can also be **combined with intrauterine balloon catheter** if bleeding persists²⁶. **Prophylactic insertion of this suture** has been used in high-risk caesarean section⁴. The **Hayman suture technique** may be a simpler procedure and quicker to apply as the lower uterine segment is not opened²⁷.

Embolisation/ligation of internal iliac arteries or embolisation/bilateral mass ligation of uterine vessels: Angioplasty balloon catheters can be used for emergency temporary occlusion in theatre, with transfer to the angiography suite for definitive embolisation²⁸.

Hysterectomy and care in theatre: Subtotal hysterectomy can be just as effective, also quicker and safer. Use Flowtrons Excell to decrease risk of DVTs. Avoid hypothermia (impairs coagulation), use fluid warmer, hair huggers, hats etc. Avoid unnecessary over-dilution. Have blood salvage and experienced operator on hand (see below).

Intraoperative blood salvage: Endorsed by NICE (2005) and RCOG (2008) guidelines. Should be set up whenever possible (check if acceptable to the patient). Either single or double suction methods can be used for collection. However, to maximise blood recovery, there is good evidence that single suction is a safe procedure²⁹. Swab washing also increases RBC recovery. A 'collect only' set-up of the anticoagulation/suction tubing will enable blood salvage to begin within minutes³⁰. Conventionally, a leukocyte filter has been used when reinfusing, though in an emergency situation the filter may be removed completely to maximise the flow rate, as prior to availability of filters no adverse events were reported. These are clinical decisions based on the balance of benefit/risk.

Management of postpartum anaemia—continued over page

Management of postpartum anaemia

IV iron should be considered for severe anaemia as oral iron is known to be slow and unreliable. In a randomised controlled study of 44 women with postpartum anaemia, significantly higher mean haemoglobin and ferritin levels from baseline were achieved for patients on **IV iron sucrose** (200 mg x 2, 48 hours apart) in comparison to those on oral iron (mean Hb day 5: IV vs oral iron, 2.5 vs 0.7gm/dl - day 14 Hb: 3.8 vs 1.5gm/dl, p = <0.01 for both periods)³¹. Comparable results for IV iron sucrose were reported in 2 similar trials (mean Hb 2.8 & 3.1, both day 14)^{32,33}. These increases in Hb from baseline with IV iron exceed the expected rise after a 2U blood transfusion³². The level of life-threatening adverse drug events of IV iron preparations is now very low, varying from 0.6 to 3.3 per million, depending on the iron preparation (FDA data)³⁴.

Erythropoiesis-stimulating agents (ESAs) should be administered **together with IV iron** in life-threatening anaemia to further accelerate erythropoiesis. A **once weekly EPO dosage of 600 IU/kg subcutaneously (e.g. 40,000IU for a 66kg patient)** is being increasingly used and found to be satisfactory in critically ill anaemic patients^{35,36}. An **EPO dosage of 300 IU/kg x 3 weekly together with IV iron (200mg x 3 weekly)** has also proved efficacious for postpartum anaemia³⁷. Augment with **vitamin B-12 and folic acid**.

Check oxygen saturations: Give **100% oxygen** if necessary (no contraindications for 48-72 hrs of use). Use **microsampling techniques** to conserve blood (e.g. HemoCue), as well as **paediatric sample tubes**. If bleeding continues consider reinfusing washed drain fluid.

Hyperbaric oxygen therapy: Option in life-threatening anaemia³⁸. (0151 648 8000 [24 hrs] for suitable and available centres.)

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This document has been reviewed by consultants in obstetrics, gynaecology, anaesthesia and haematology (including experts in haemostasis). It reflects current clinical and scientific knowledge and is subject to change. The strategies are not intended as an exclusive guide to treatment. Good clinical judgement, taking into account individual circumstances, may require adjustments.

Addendum C: Antenatal checklist for women refusing blood transfusion

Patient Name and Address	
Date of Birth	
Hospital Number	
Telephone Number(s)	
Consultant Surgeon	
Consultant Anesthetist	
Sp Registrar (and Bleep Number)	

Statement: I, the above-named patient, am prepared to accept the following treatments, before, during or after my operation:—

TREATMENT	WILLING TO ACCEPT
Recombinant Erythropoietin [☑]	Yes/No
Hematinics (e.g. Intravenous/Oral Iron, Folic Acid, Vitamin B ₁₂) [☑]	Yes/No
Acute Normovolaemic Hemodilution*	Yes/No
Intraoperative Cell Salvage*	Yes/No
Fresh Frozen Plasma [#]	Yes/No
Cryoprecipitate*	Yes/No
Immunoglobulins, Anti-D*	Yes/No
Prothrombin Complex Concentrate (PCCs, e.g. Beriplex)*	Yes/No
Fibrinogen, Fibrin Glues and Sealants (Human and Non-Human)*	Yes/No
Recombinant Clotting Factors (e.g. Factor VIIa) [☑]	Yes/No
DDAVP (Desmopressin), Tranexamic Acid (TXA), Aprotinin [☑]	Yes/No
Packed Red Cells, Plasma, Platelets if required to save life [#]	Yes/No

Signature of Patient

Date: __/__/__

Addendum D: Example of document serving as a release for hospital in the event that a woman dies after declining administration of blood and blood products

Advance Decision to Refuse Specified Medical Treatment

1. I, _____ (print or type full name),
born _____ (date) complete this document to set forth my treatment instructions in case of my incapacity. **The refusal of specified treatment(s) contained herein continues to apply even if those medically responsible for my welfare and/or any other persons believe that such treatments are necessary to sustain my life.**

2. I am one of Jehovah's Witnesses with firm religious convictions. With full realization of the implications of this position I direct that **NO TRANSFUSIONS OF BLOOD or primary blood components (red cells, white cells, plasma or platelets)** be administered to me in any circumstances. I also refuse to predonate my blood for later infusion.

3. **Regarding minor fractions of blood** (for example: albumin, coagulation factors, immunoglobulins): [Initial **one** of the three choices below.]
 - (a) _____ I refuse all
 - (b) _____ I accept all
 - (c) _____ I want to qualify either (3a) or (3b) above and my treatment choices are as follows:

4. **Regarding autologous procedures** (involving my own blood, for example: haemodilution, heart bypass, dialysis, intra-operative and post-operative blood salvage): [Initial **one** of the three choices below.]
 - (a) _____ I refuse all such procedures or therapies
 - (b) _____ I am prepared to accept any such procedure
 - (c) _____ I accept only the following procedures:

- I am prepared to accept diagnostic procedures, such as blood samples for testing.

5. **Regarding other welfare instructions** (such as current medications, allergies, and medical problems):

6. I consent to my medical records and the details of my condition being shared with the Emergency Contact below and/or with member(s) of the Hospital Liaison Committee for Jehovah's Witnesses.

7. _____
 Signature Date

 Address

8. **STATEMENT OF WITNESSES:** The person who signed this document did so in my presence. He or she appears to be of sound mind and free from duress, fraud, or undue influence. I am 18 years of age or older.

 Signature of witness

 Signature of witness

 Name Occupation

 Name Occupation

 Address

 Address

 Telephone

 Telephone

 Mobile

 Mobile

9. **EMERGENCY CONTACT:**

 Name

 Address

 Telephone Mobile

10. **GENERAL PRACTITIONER CONTACT DETAILS:** A copy of this document is lodged with the Registered General Medical Practitioner whose details appear below.

 Name

 Address

 Telephone Number(s)



NO BLOOD

(signed document inside)

Advance Decision to Refuse Specified Medical Treatment

Advance Decision to Refuse Specified Medical Treatment

(signed document inside)

NO BLOOD

