



Higher Specialist Diploma

Transfusion Science

September 2025

Short Answer Questions

60 minutes

Attempt all Four Questions

Instructions to Candidates

1. Record your candidate number and HSD discipline on the front sheet of the answer booklet.
2. Record your candidate number, the question number and the page number in the spaces provided on the answer sheets.
3. Begin each new answer on a new page.
4. Each question is worth 25 marks.

1. You receive the NEQAS report for an **antigen typing** exercise for 3 laboratories within your Trust and have received some penalty points. Here are the results that were submitted.

	Hub (Main laboratory)		Spoke 1		Spoke 2	
	Fya	Fyb	Fya	Fyb	Fya	Fyb
NEQAS Patient 1	-	+	-	+	-	+
	Fya	Fyb	Fya	Fyb	Fya	Fyb
NEQAS Patient 2	-	+	-	-	-	+

Critically evaluate the results, possible causes and explain your next steps as quality lead for Blood Transfusion.

2. You have been tasked with introducing a new fetal red cell detection kit (Kleihauer kit) into the laboratory. Outline your approach, what you must consider and why.
3. You receive a phone call from a surgical consultant asking if their patient requires irradiated blood as they have just been informed that their patient was diagnosed and treated for Hodgkin's Lymphoma 20 years previously. The patient is currently being transfused 1 "non-irradiated" red cell on the ward and had previously received 1 red cell unit during surgery.
Discuss what steps you would take and explain why.
4. You have been asked to review the standard operating procedure for '*Concessionary release of blood and blood components in emergency situations*' - What should be included in this procedure to ensure patients do not suffer harm from avoidable delays in transfusion?



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Essay Paper

120 minutes

Attempt 2 out of 5 Questions

Instructions to Candidates

1. Record your candidate number and HSD discipline on the front sheet of the answer booklet.
2. Record your candidate number, the question number and the page number in the spaces provided on the answer sheets.
3. Begin each new answer on a new page.
4. Each question is worth 100 marks.

1. Critically discuss the use of IT systems within the blood transfusion pathway to improve patient safety and meet regulatory requirements.
2. Serious Hazards of Transfusion (SHOT) recently released a safety notice for the *safe, appropriate and timely administration of anti-D immunoglobulin during the perinatal period*. Critically discuss the reasons behind the safety notice and the consequences if not followed correctly.
3. Transfusion reactions are defined as adverse events associated with the transfusion of whole blood or one of its components. Discuss the various types of reportable reactions, their causes and symptoms, and how the management and coordination between hospital teams can be vital to patient care.
4. Critically discuss the key methods used to investigate and positively identify a clinically significant alloantibody. Evaluate the advantages and limitations of the methods described. Additionally, describe how accurately identifying clinically significant alloantibodies can impact on patient safety and treatment outcome?
5. You have been asked to perform a 20 minute presentation on '*The diagnosis and management of Neonatal alloimmune thrombocytopaenia*' to newly qualified midwives. Outline the content of the presentation and critically discuss the importance of the information you have included.



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Transfusion Science

Examination – September 2025

CASE STUDIES

Attempt all case studies

Instructions to candidates

1. Record your candidate number and HSD discipline on the front sheet of the answer booklet.
2. Record your candidate number, the question number and the page number in the spaces provided on the answer sheets.
3. Begin each case study on a new page.
4. Each question is worth 100 marks.
5. For these case study questions you are strongly advised to answer the questions as they arise during the case study to avoid later information impacting adversely on your answers to the earlier questions by presuming an “outcome”.

Seen Case Study

You receive a sample from an antenatal patient, who is 16 weeks pregnant, following a sensitising event. The patient has previously had a single uneventful pregnancy 2 years ago and has no previous transfusion history.

You perform ABO/D blood grouping, an antibody screen and subsequent antibody ID panel, shown below. Testing is performed using gel card technology.

Blood Grouping Result

Anti-A	Anti-B	Anti-D (1)	Anti-D (2)	A ₁ cells	B cells	Control
0	4+	0	0	4+	0	0

Antibody Screen Result

Cell	Rh	\bar{C}	C	c	D	E	e	M	N	S	s	P1	Lu ^a	K	k	Kp ^a	Le ^a	Le ^b	Fy ^a	Fy ^b	Jk ^a	Jk ^b	IAT
I	R ₁ ^w R ₁	+	+	-	+	-	+	+	-	-	+	-	-	-	-	-	-	-	+	-	-	+	4+
II	R ₂ R ₂	-	-	+	+	+	-	+	-	-	+	+	-	-	+	-	+	-	+	-	+	-	4+
III	rr	-	-	+	-	+	+	+	+	+	-	+	-	+	+	-	-	+	-	+	+	+	0

Antibody Panel Result

Cell	Rh	C ^w	C	c	D	E	e	M	N	S	s	P ₁	Lu ^a	K	k	Kp ^a	Le ^a	Le ^b	Fy ^a	Fy ^b	Jk ^a	Jk ^b	IAT	Pap
1	R ₁ ^w R ₁	+	+	0	+	0	+	+	+	+	0	0	0	0	+	0	0	+	+	0	+	0	4+	5+
2	R ₁ R ₁	0	+	0	+	0	+	+	0	+	0	3+	0	0	+	0	+	0	+	0	+	0	4+	5+
3	R ₂ R ₂	0	0	+	+	+	0	+	0	+	+	3+	0	+	+	+	0	+	0	+	+	+	4+	5+
4	r'r	0	+	+	0	0	+	0	+	0	+	4+	0	0	+	0	0	+	+	0	0	+	4+	5+
5	r''r	0	0	+	0	+	+	0	+	+	+	0	0	0	+	0	0	0	+	+	0	+	0	0
6	rr	0	0	+	0	0	+	+	+	+	0	4+	0	+	+	0	0	0	0	+	+	0	0	0
7	rr	0	0	+	0	0	+	0	+	0	+	2+	0	0	+	0	0	0	+	+	0	+	0	0
8	rr	0	0	+	0	0	+	+	0	+	+	3+	0	0	+	0	0	+	+	+	0	+	0	0
9	rr	0	0	+	0	0	+	0	+	0	+	0	+	0	+	0	0	+	0	+	0	+	0	0
10	rr	0	0	+	0	0	+	+	+	0	+	3+	0	+	0	+	+	0	+	+	+	0	0	0
Auto	rr	/	0	+	0	0	+	/	/	/	/	/	/	0	/	/	/	/	/	/	/	/	0	

- Comment on the results obtained, stating the patient's blood group and which antibodies can be conclusively identified and/or excluded. (15 marks)
- What further testing would you employ at this stage? (20 marks)
- At what levels / concentration of antibody would you consider the following; (25 marks)
 - referral to a Fetal Medicine Unit
 - Expectation of severe Haemolytic Disease of the Fetus and Newborn
 - Recommendation for prophylaxis

- d. What further testing is required throughout this pregnancy and what other actions should be taken to ensure this patient is managed appropriately in the future? (20 marks)
- e. What blood should be selected for the mother should she required transfusion at delivery, and what specification is required should the foetus / neonate require transfusion during the pregnancy or at delivery? (20 marks)

Unseen Case Studies

2.
A 25 year old male attends the emergency department after a road traffic collision which has resulted in a fractured femur. No components were transfused during the pre-hospital care. You receive a blood group and antibody screen sample, followed by a confirmatory sample, prior to the patient being prepared for surgery. The samples are marked as urgent. You prioritise the samples and place them on the analyser for urgent blood group and antibody screens.

Results

Blood Grouping – Sample 1

Anti-A	Anti-B	Anti-D (1)	Anti-D (2)	A ₁ cells	B cells	Control
0	0	4+	4+	4+	4+	0

Blood Grouping – Sample 2

Anti-A	Anti-B	Anti-D (1)
0	0	4+

Antibody Screen (same results both samples)

Cell	Rh	C ^w	C	c	D	E	e	M	N	S	s	P1	Lu ^a	K	k	Kp ^a	Le ^a	Le ^b	Fy ^a	Fy ^b	Jk ^a	Jk ^b	IAT
I	R ₁ ^w R ₁	+	+	-	+	-	+	+	-	-	+	-	-	-	-	-	-	-	+	-	-	+	4+
II	R ₂ R ₂	-	-	+	+	+	-	+	-	-	+	+	-	-	+	-	+	-	+	-	+	-	4+
III	rr	-	-	+	-	+	+	+	+	+	-	+	-	+	+	-	-	+	-	+	+	+	4+

Due to the antibody screen results, you perform an antibody panel.

Results of antibody panel (using sample 2)

Cell	Rh	C ^w	C	c	D	E	e	M	N	S	s	P ₁	Lu ^a	K	k	Kp ^a	Le ^a	Le ^b	Fy ^a	Fy ^b	Jk ^a	Jk ^b	IAT	Pap
1	R ₁ ^w R ₁	+	+	0	+	0	+	+	+	+	0	0	0	0	+	0	0	+	+	0	+	0	4+	4+
2	R ₁ R ₁	0	+	0	+	0	+	+	0	+	0	3+	0	0	+	0	+	0	+	0	+	0	4+	4+
3	R ₂ R ₂	0	0	+	+	+	0	+	0	+	+	3+	0	+	+	+	0	+	0	+	+	+	4+	4+
4	r ['] r	0	+	+	0	0	+	0	+	0	+	4+	0	0	+	0	0	+	+	0	0	+	4+	4+
5	r ["] r	0	0	+	0	+	+	0	+	+	+	0	0	0	+	0	0	0	+	+	0	+	4+	4+
6	rr	0	0	+	0	0	+	+	+	+	0	4+	0	+	+	0	0	0	0	+	+	0	4+	4+
7	rr	0	0	+	0	0	+	0	+	0	+	2+	0	0	+	0	0	0	+	+	0	+	4+	4+
8	rr	0	0	+	0	0	+	+	0	+	+	3+	0	0	+	0	0	+	+	+	0	+	4+	4+
9	rr	0	0	+	0	0	+	0	+	0	+	0	+	0	+	0	0	+	0	+	0	+	4+	4+
10	rr	0	0	+	0	0	+	+	+	0	+	3+	0	+	0	+	+	0	+	+	+	0	4+	4+
Auto	rr	/	0	+	0	0	+	/	/	/	/	/	/	0	/	/	/	/	/	/	/	/	0	

As the request was marked 'urgent' and the antibody screen was positive, you serologically crossmatch 4 units of group O D Positive red cells by IAT.

Results (using sample 2)

Donor units	Results of crossmatch
1. Donor unit (O D Positive)	4+
2. Donor unit (O D Positive)	4+
3. Donor unit (O D Positive)	4+
4. Donor unit (O D Positive)	4+

- a. Discuss, in detail, the results you have **so far**. Based on the results, what might be the cause and what should your next steps include? (20 marks)

The clinical team contacts you to request 2 red cell units urgently as the patient is bleeding and is tachycardic. You receive additional information at this point – the patient has no previous transfusion or transplantation history and is of Indian descent. You inform them that you are awaiting a new sample and that no compatible blood is available at this time, however you request they speak to a Haematology Consultant urgently to discuss the concessionary release protocol.

- b. What might you suspect as being the cause of the reactions with the new information you have obtained; how would it be confirmed? (15 marks)
- c. What actions should you take with this new information? (10 marks)

After 20 minutes you receive a phone call to say that the patient is having a suspected transfusion reaction to the first unit of emergency O D negative red cells that were accessed from the theatre fridge and transfused.

d. Describe, in detail, the immediate actions you should take following this phone call and how the patient should be managed. (15 marks)

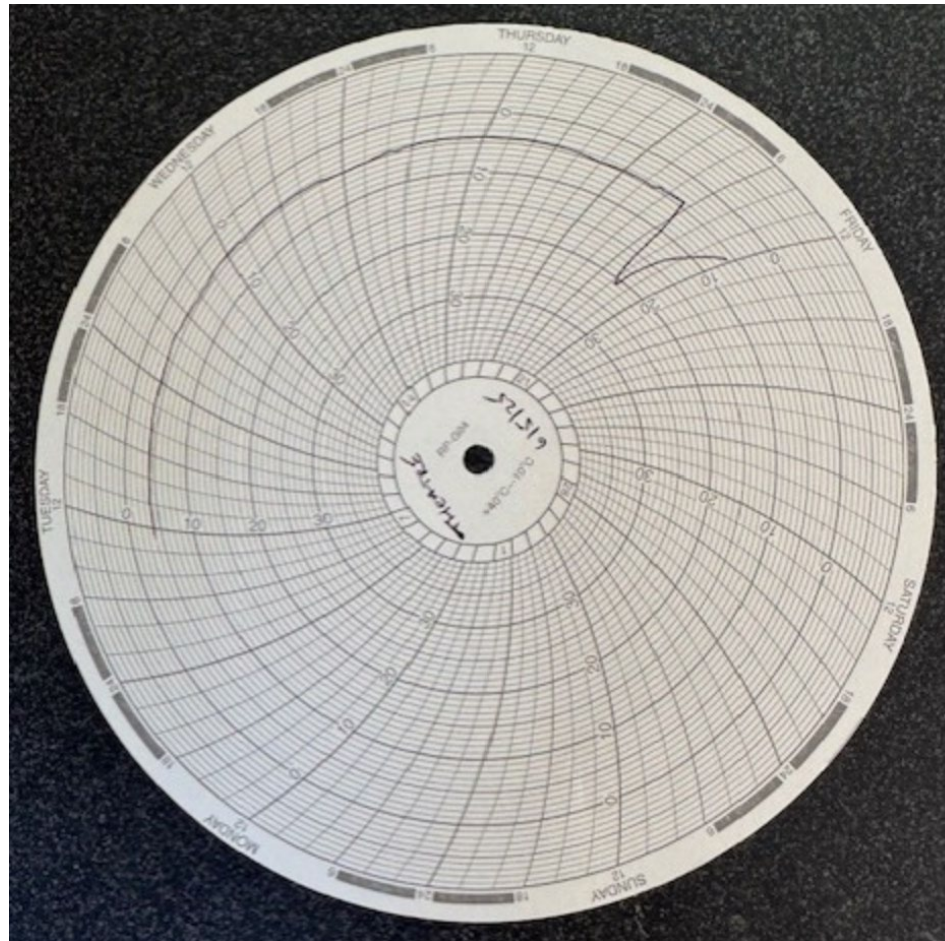
e. How should this event be recorded? (10 marks)

f. You receive initial results from RCI confirming your suspicions for the patient's link between their blood group and antibody status. Following this, describe why were all four donor units incompatible and discuss where you might source compatible red cells from. (10 marks)

g. What considerations should be discussed for the management of this patient, both short and long term, in the event of future surgeries? (10 marks)

h. What information should be passed onto the patient and how might this be useful? (10 marks)

3.
A medical laboratory assistant returns with a picture of the fridge chart from the blood fridge in Theatres. She thinks it doesn't look right and is wondering what to do. She also reports that the fridge alarm is muted. Below is the fridge chart:



a. What actions are you going to take and why?

(25 marks)

While investigating the fridge failure, you receive a phone call from Theatre Recovery stating that a patient, who is currently being transfused a 3rd unit of blood, is currently experiencing a rise in temperature, from 37.9°C to 39.5°C, accompanied by chills/rigors and shortness of breath.

b. What immediate advice are you going to give and why?

(15 marks)

On investigation you discover the patient is a 42-year-old female who had been admitted to Theatres some hours earlier with gastrointestinal bleeding. She has a history of two previous pregnancies and a transfusion six years previously following a PPH after delivery of her 2nd child. The laboratory electronically issued four units of blood prior to her going to Theatre. She had received two of the four units during the exploratory operation without incident. The results of her transfusion reaction investigation are below:

ABO/D blood group

	Anti-A	Anti-B	Anti-D	Control	A1 cells	B cells
Pre-transfusion sample	0	0	4+	0	0	4+
Post-transfusion sample	0	0	4+	0	0	4+

Antibody screen:

Cell	Rh	C	D	E	c	e	C ^w	M	N	S	s	P1	Lu ^a	K	k	Kp ^a	Le ^a	Le ^b	Fy ^a	Fy ^b	Jk ^a	Jk ^b	Pre-transfusion	Post-Transfusion
1	R1 ^w R1	+	+	0	0	+	+	+	+	+	+	+	0	+	+	0	+	0	+	0	+	0	0	0
2	R2R2	0	+	+	+	0	0	+	0	+	0	+	0	0	+	0	0	+	+	+	+	+	0	0
3	rr	0	0	0	+	+	0	0	+	0	+	+	0	0	+	0	0	+	0	+	0	+	0	0

DAT:

	IgG	C3d	Control
Pre-transfusion sample	0	0	0
Post-transfusion sample	1+	0	0
Donor Red cell unit 1	0	0	0
Donor Red cell unit 2	0	0	0
Donor Red cell unit 3	0	0	0

Serological Crossmatch:

	Unit 1 (transfused)	Unit 2 (transfused)	Unit 3 (part transfused)	Unit 4 (not transfused)
Pre-transfusion sample	Compatible	Compatible	2+ Incompatible	Compatible
Post-transfusion sample	Compatible	Compatible	2+ Incompatible	Compatible

Haematology/Biochemistry:

	Pre-transfusion	Post-transfusion	Ref. range
Haemoglobin	78 g/L	85 g/L	120-160 g/L
Bilirubin	10 µmol/L	37 µmol/L	0-20 µmol/L
Lactate dehydrogenase	Not performed	380 IU/L	120-150 U/L

c. Comment on all the results above.

(15 marks)

d. What further testing would you undertake and why?

(15 marks)

The result of the antibody panel is below:

Cell	Rh	C ^w	C	c	D	E	e	M	N	S	s	P ₁	Lu ^a	K	k	Kp ^a	Le ^a	Le ^b	Fy ^a	Fy ^b	Jk ^a	Jk ^b	Pre transfusion	Post transfusion
1	R ₁ ^w R ₁	+	+	0	+	0	+	+	+	+	0	0	0	0	+	0	0	+	+	0	+	0	0	0
2	R ₁ R ₁	0	+	0	+	0	+	+	0	+	0	3+	0	0	+	0	+	0	+	0	+	0	0	0
3	R ₂ R ₂	0	0	+	+	+	0	+	0	+	+	3+	0	+	+	0	0	+	0	+	+	+	0	0
4	r'r	0	+	+	0	0	+	0	+	0	+	4+	0	0	+	0	0	+	+	0	0	+	0	0
5	r''r	0	0	+	0	+	+	0	+	+	+	0	0	0	+	0	0	0	+	+	0	+	0	0
6	rr	0	0	+	0	0	+	+	+	+	0	4+	0	+	+	0	0	0	0	+	+	0	0	0
7	rr	0	0	+	0	0	+	0	+	0	+	2+	0	0	+	0	0	0	+	+	0	+	0	0
8	rr	0	0	+	0	0	+	+	0	+	+	3+	0	0	+	+	0	+	+	+	0	+	2+	2+
9	rr	0	0	+	0	0	+	0	+	0	+	0	+	0	+	0	0	+	0	+	0	+	0	0
10	rr	0	0	+	0	0	+	+	+	0	+	3+	0	+	0	0	+	0	+	+	+	0	0	0
Auto	rr																						0	1+

e. What antibody(s) can you identify and what is the significance of the result?

(20 marks)

f. What further actions would you take to ensure suitable blood is provided this patient for future transfusions?

(10 marks)