SPECIALIST CERTIFICATE IN TRANSFUSION SCIENCE PRACTICE

PROGRAMME OF STUDY OVERVIEW – Example only

British Blood Transfusion Society

Duration: 12 months May to April

This document serves as a general programme overview only. To ensure you are keeping to schedule you must log on to the BBTS student area regularly to view the most current/ up-to-date information and tasks.
The 'set text' refers to the accompanying study book. Where required other reading material will be identified by name and location.
The timings are a guide to help you structure your study planning.
You will be directed to learning activities specific to your specialist option via the online student area.

Month 1 topics	**Learning outcomes**	**Tasks**
1. Immunology refresher	Explain what constitutes a blood group antigen Explain and describe the composition of the red cell membrane Explain, describe and discuss blood group antibody production with respect to ☞ Stimulation processes ☞ Primary and secondary immune responses ☞ Polyclonal antibodies ☞ Monoclonal antibodies Describe basic antibody structures and properties of IgG and IgM	• Read chapters 1 and 2 • Access the supplementary online materials as directed • Complete the action/ reflection exercises in chapters 1 and 2 • Take part in the first compulsory discussion activity
2. Antigen-antibody reactions	Explain the primary and secondary stages of antigen-antibody reactions Explain the factors affecting antigen-antibody reactions Explain how tests can be manipulated to enhance results Explain the different endpoints of antigen-antibody reactions	
Month 2	**Learning outcomes**	**Tasks**
3. Reagents, techniques and controls	Explain how manufactured reagents help to ensure valid results Explain the following with respect to serological testing	• Read chapter 3 • Access the supplementary online materials as

	☞ the need for, and use of controls and how to select them ☞ the range of reagents available ☞ the different techniques used ☞ the use of enzyme treated cells ☞ the use Anti-Human Globulin (AHG) ☞ the requirement for different red cell suspensions and how they are used Recognise the requirement for equipment maintenance and calibration	directed • Complete the action/ reflection exercises in chapter 3 • Take part in the second compulsory discussion activity
Month 3	**Learning outcomes**	**Tasks**
4. Antibody mediated red cell destruction	Explain the basics of the classic complement cascade including: ☞ the sequences of the classic complement cascade ☞ how the complement cascade is regulated Outline the mechanisms of intravascular and extravascular red cell destruction Explain the differences between intravascular and extravascular red cell destruction Describe the clinical signs and symptoms of *in vivo* red cell destruction Identify the factors affecting the clinical significance of blood group antibodies	• Read chapters 4 and 5 • Access the supplementary online materials as directed • Complete the action/ reflection exercises in chapters 4 and 5 • Take part in the third compulsory discussion activity
5. Basic genetics and transfusion terminology	Explain and distinguish between the following terms ☞ Inheritance ☞ DNA ☞ Chromosome ☞ Gene ☞ Allele ☞ Polymorphism Explain the following basic inheritance terms ☞ Dominant gene ☞ Co-dominant gene ☞ Recessive gene ☞ Amorphic gene Explain how genetic inheritance can result in different blood group antigen expression	

	Understand how genes result in protein expression Explain the terms genotype and phenotype Interpret genotype into phenotype (and vice versa) Describe, explain and use blood group terminology	
Month 4	**Learning outcomes**	**Tasks**
6. The ABO blood group system	Describe the basic genetic background of the ABO system ☞ Investigate family trees based on ABO grouping results Describe the biochemistry of ABO antigen production ☞ List the ABO transferases, explain their action and list their products Describe and discuss the different antigens of the ABO system with respect to ☞ expression ☞ development at birth ☞ common subgroups ☞ some rare subgroups List the frequencies of the four major ABO blood groups in the UK population List some of the frequency variations found in different ethnic populations Explain and discuss the relationship of the H blood group system to the ABO blood group system Outline the mechanism leading to the O_h (Bombay) blood group including ☞ inheritance patterns	• Read chapter 6 • Access the supplementary online materials as directed • Complete the action/ reflection exercises in chapter 6 • Take part in the fourth compulsory discussion activity
Month 5	**Learning outcomes**	**Tasks**
7. The Rh blood group system	Describe the basic genetic background of the Rh system Explain and use terminology relating to Rh ☞ genotypes ☞ haplotypes ☞ phenotypes Describe and discuss the Rh system with respect to ☞ antigen development at birth ☞ weak D types ☞ D variants/ partial D types ☞ Rh deletions	• Read chapter 7 • Access the supplementary online materials as directed • Complete the action/ reflection exercises in chapter 7 • Take part in the fifth compulsory discussion activity

	☞ Rh_{null} phenotype ☞ the C, c, E, e and G antigens List the frequencies of the 5 major Rh antigens in the UK population List some of the frequency variations found in different ethnic populations Describe and discuss Rh antibodies with respect to ☞ production ☞ immunoglobulin class ☞ methods of detection ☞ ability to bind complement ☞ clinical significance selection of blood components for transfusion	
Month 6	**Learning outcomes**	**Tasks**
8. Other Blood group systems	Describe the main features and characteristics of the following blood group systems ☞ MNS ☞ P1PK ☞ Lutheran ☞ Kell ☞ Lewis ☞ Duffy ☞ Kidd Determine, discuss and categorise the clinical significance of the different antibodies produced by the major blood group systems Determine, compare and contrast the *in vitro* characteristics of the different antibodies produced by the major blood group systems List the main antigens and their frequencies for a range of populations for the major blood group systems Discuss the impact of differing antigen frequencies on availability of antigen negative (or IAT crossmatch compatible) red cells for transfusion Calculate the availability of various antigen negative red cells in the UK donor population for a variety of antibody specificities ☞ Including for patients with multiple antibodies	• Read chapters 8 and 9 • Access the supplementary online materials as directed • Complete the action/ reflection exercises in chapter 8 and begin those in chapter 9 • Take part in the sixth compulsory discussion activity

9. Antibody Screening and Identification	Identify a variety of null phenotypes and explain their implications for transfusion Show awareness of some antigens and antibodies of the following minor blood group systems and their implications for transfusion ☞ I ☞ Diego ☞ Yt ☞ Dombrock ☞ Colton ☞ Indian ☞ Vel ☞ Knops ☞ Chido/ Rodgers Explain the purpose of antibody screening Explain the difference between antibody screening and identification Recognise and describe good and poor examples of screening and identification reagent cells	
Month 7	**Learning outcomes**	**Tasks**
10. Antibody Screening and Identification continued 11. Pre-transfusion testing	Describe and perform the process of antibody identification Describe and perform the process of antibody exclusion including ☞ correct selection of reagent red cells ☞ requirement for 'double-dose' antigen expression for certain antibody specificities Explain, describe and recognise the requirement for additional antibody identification tools ☞ Enzyme technique ☞ Enzyme IAT ☞ Room Temperature technique (18-22$_o$C) ☞ Red cell phenotyping Describe, explain and discuss sample acceptance and storage criteria including ☞ Positive patient identification	• Continue with chapter 9 • Read chapter 10 • Access the supplementary online materials as directed • Complete the action/ reflection exercises in chapter 9 and begin those in chapter 10 • Take part in the seventh compulsory discussion activity

	☞ Clerical and demographic checks ☞ Use of EDTA samples ☞ Sample collection timing ☞ Sample storage and retention Describe, explain and discuss routine sample testing requirements	
Month 8	**Learning outcomes**	**Tasks**
12. Pre-transfusion testing continued 13. Hazards of Transfusion	Describe, explain and discuss additional testing requirements Describe, explain and discuss the selection of red cells for transfusion including ☞ ABO group choices ☞ D group choice ☞ Crossmatching procedures ☞ Patients with alloantibodies ☞ Specific patient groups with additional considerations Outline, explain and discuss the provision of red cells in an emergency situation including ☞ Abbreviation of routine testing Outline, describe, explain and discuss hazards associated with blood transfusion under the following headings: ☞ Transfusion Transmitted Infections (TTI) ☞ Mechanical Effects ☞ Metabolic Effects ☞ Immune Reactions Describe, explain and discuss the preventative measures in place to safeguard the blood supply Describe, explain and discuss reactive response to hazards of transfusion when they occur Outline, explain, investigate and discuss the issues and actions required following a suspected transfusion reaction to a blood group antibody Explain and discuss the limitations of pre-transfusion testing procedures in preventing haemolytic transfusion reactions due to blood group antibodies Describe and explain haemovigilance	• Continue with chapter 10 • Read chapter 11 • Access the supplementary online materials as directed • Complete the action/ reflection exercises in chapters 10 and 11 • Take part in the eighth compulsory discussion activity

	Describe and discuss UK transfusion hazard reporting systems including ☞ Who, what, when, how, why ☞ Reporting categories	
Month 9	**Learning outcomes**	**Tasks**
14. Blood Components	Outline the basic eligibility criteria for blood donation in the UK Describe and discuss the whole blood collection process Outline the apheresis collection process (component donation) Describe and discuss the Donation Identification Number (DIN) system used in the UK Outline, describe, explain and discuss blood donation, transportation and processing timelines Outline, describe, explain and discuss the manufacture of routine blood components ☞ Red cells ☞ Pooled platelets ☞ Fresh Frozen Plasma ☞ Cryoprecipitate Describe, explain and discuss universal leucodepletion as a preventative measure to safeguard the blood supply Outline, explain and discuss additional requirements for component manufacture for ☞ Fetal, neonatal and paediatric use ☞ Adult patients with special requirements ☞ Irradiation process ☞ Pathogen inactivation/ reduction measures Describe, explain and discuss the UK specifications, storage and use of blood components ☞ Routine ☞ Non-routine ☞ Adult use ☞ Fetal, neonatal and paediatric use	• Read chapters 12 and 13 • Access the supplementary online materials as directed • Complete the action/ reflection exercises in chapter 12 and begin those in chapter 13 • Take part in the ninth compulsory discussion activity

15. Blood Donation Testing	Outline the *basic* clinical demand for ☞ Red cells ☞ Platelets ☞ Fresh Frozen Plasma ☞ Cryoprecipitate ☞ Granulocytes Describe, explain and discuss component selection by ABO group for a range of patients Outline basic quality monitoring for blood component manufacture Explain and discuss the effects of storage on blood components Explain and discuss the benefits and limitations of Methylene Blue treatment of blood components Outline, describe and explain the mandatory tests required to ensure the safety of the UK blood supply Outline, describe and discuss blood grouping tests performed on UK blood donors including ☞ Protocols used to optimise ABO and D grouping of blood donors ☞ ABO and D grouping anomalies (identification and investigation) ☞ Additional phenotyping that may be performed by the blood grouping laboratory ☞ Antibody screening (adult and neonatal components) ☞ High-titre haemolysin screening ☞ Haemoglobin S screening	
Month 10	**Learning outcomes**	**Tasks**
16. Blood Donation Testing continued	Give an overview of the following transfusion transmissible infections ☞ HBV ☞ HIV ☞ HCV ☞ HTLV I/II ☞ Syphilis ☞ CMV ☞ Malaria	• Continue with chapter 13 • Access the supplementary online materials as directed • Complete the action/ reflection exercises in chapter 13 • Take part in the tenth compulsory discussion activity

17. Antenatal Serology	☞ *Trypanosoma cruzi* ☞ West Nile Virus Outline, describe and discuss microbiological tests performed on UK blood donors including ☞ Rationale for mandatory tests ☞ Rationale for additional/ discretionary tests ☞ Detection of various microbiological markers and associated window periods ☞ Bacterial testing of platelet components Outline, explain and discuss the cause of HDFN Outline and discuss the mechanisms that can lead to antibody production in the mother Explain the consequences of red cell destruction in utero and after birth Explain and discuss the properties of blood group antibodies with respect to HDFN ☞ Classify the blood group antibodies capable of causing HDFN ☞ Identify the blood group antibodies that do not cause HDFN Outline and discuss the purpose and process of antenatal screening in the UK Outline and explain reactive and proactive HDFN prevention measures in the UK Outline and discuss the treatment options for HDFN	• Read chapter 15 • Access the supplementary online materials as directed • Complete the action/ reflection exercises in chapter 15 • Take part in the eleventh compulsory discussion activity
Month 11	**Learning outcomes**	**Tasks**
18. Quality	Outline and discuss Blood Safety and Quality Regulations (BSQR) legislation Outline the regulatory bodies involved in transfusion Outline, explain and discuss the requirement for a Quality Management System (QMS) Outline, explain and discuss the requirement for Quality Assurance including ☞ Good Manufacturing Practice ☞ Quality Control ☞ Incident reporting ☞ Audit ☞ Change control and validation	• Read chapter 14 • Access the supplementary online materials as directed • Complete the action/ reflection exercises in chapter 14 • Take part in the twelfth compulsory discussion activity

19. Revision	Discuss haemovigilance with respect to the QMS Begin your revision preparation	 Revision activities and support will be available online
Month 12	**Learning outcomes**	**Tasks**
20. Revision period	**Preparation for the final examination** You will be directed to revision activities and questions via the online student area. **Remember!** *You must have completed at least 75% of the compulsory discussion activities before you sit the examination.*	Revision activities and support will be available online