
Table of Contents

Preface **xix**

About the Editor **xxi**

1. Hemolytic Transfusion Reactions **1**

*Yvette C. Tanhehco, PhD, MD, MS, and Robertson D.
Davenport, MD*

Overview	1
Epidemiology	3
Pathophysiology	4
Clinical Presentation	11
Differential Diagnosis	13
Laboratory Diagnosis	14
Management	18
Prevention	20
Summary	28
References	28

2. Febrile Nonhemolytic Transfusion Reactions **35**

*Michelle P. Zeller, MD, FRCP(C), MHPE, DRCPSC, and
Kathryn E. Webert, MD, FRCP(C), MSc*

Clinical Presentation	36
Differential Diagnosis	36
Bacterial Contamination	38
Epidemiology	41
Pathophysiology	47
Treatment and Management	56
Prevention	60
Further Research	71
References	73

3. Allergic and Anaphylactic Reactions 81

Magali J. Fontaine, MD, PhD, and Bryon P. Jackson, MD, MHA

Epidemiology	82
Clinical Presentation	84
Differential Diagnosis	85
Pathophysiology	88
Laboratory Diagnosis	98
Treatment and Prevention	99
Summary	105
References	105

4. Bacterial Contamination 115

Sandra Ramírez-Arcos, MSc, PhD, ARMCCM, and Mindy Goldman, MD, FRCP(C)

Historical Overview	116
Epidemiology	117
Presentation and Complications	117
Microorganisms Implicated	122
Mechanisms of Contamination	128
Differential Diagnosis	131
Diagnosis and Strategies	132
Management	134
Prevention Strategies	134
Summary	149
References	149

5. Transfusion-Related Acute Lung Injury 165

Alexander P.J. Vlaar, MD, PhD, MBA, and Patricia M. Kopko, MD

History	165
Definitions	166
Clinical Presentation and Complications	169
Epidemiology	171
Risk Factors	172
Implicated Blood Components	173
Pathophysiology	174
Differential Diagnosis	184
Diagnosis	186

Table of Contents

Treatment	186
Transfusions after a Suspected Reaction	187
Prevention	188
The Future	191
References	191
6. Transfusion-Associated Graft-vs-Host Disease	199
<i>Chang Liu, MD, PhD; Brenda J. Grossman, MD, MPH; and Kenneth C. Anderson, MD</i>	
History	200
Epidemiology	201
Pathophysiology	203
Risk Factors	206
Clinical Presentation	212
Diagnosis	213
Management and Outcome	216
Prevention	217
Summary	222
References	223
7. Hypotensive Transfusion Reactions	233
<i>Nancy Robitaille, MD, FRCP(C); Heather A. Hume, MD, FRCP(C); and Pierre Robillard, MD</i>	
Clinical Presentation	234
Epidemiology	238
Pathophysiology	240
Management and Prevention	248
Summary	249
References	250
8. Posttransfusion Purpura	255
<i>Ruchika Sharma, MD, and Anand Padmanabhan, MD, PhD</i>	
Platelet-Specific Antigens	255
Epidemiology	256
Clinical Presentation	256
Pathophysiology	263
Differential Diagnosis	270
Laboratory Diagnosis	271

Transfusion Reactions

Treatment 272
Prognosis 273
Special Cases 274
Summary 274
References 275

9. Transfusion Reactions Associated with Hematopoietic Progenitor Cell Infusion and Related Cellular Therapies 281

*Laura Cooling, MD, MS; Xiangrong (Eric) He, MD, PhD; and
Jed B. Gorlin, MD, MBA*

General Overview of HPC Products 282
T Cell Immunotherapies 283
Pathophysiology 285
Clinical Presentation and Complications 290
Strategies to Prevent or Ameliorate Reactions 311
Reporting Requirements 317
Summary 318
References 318

10. Transfusion-Associated Circulatory Overload 331

Ingrid Perez-Alvarez, MD, and Patricia M. Kopko, MD

Clinical Presentation and Diagnosis 332
Differential Diagnosis 332
Demographics of TACO 336
Role of the Clinical Laboratory 337
Epidemiology and Risk Factors 339
Morbidity and Mortality 341
Pathophysiology 342
Flow Rate 343
Management 344
Prevention 344
Summary 345
References 345

Table of Contents

11. Unconfirmed Transfusion Reactions 349

Elizabeth S. Allen, MD, and Robertson D. Davenport, MD

Acute Pain Transfusion Reactions 353
Transfusion-Associated Dyspnea 356
Transfusion-Associated Posterior Reversible
Encephalopathy Syndrome 358
Transfusion-Related Acute Gut Injury 364
Conclusion 370
References 371

**12. Potential Risks and Negative Effects of Autologous
Transfusion Practices 375**

*Chelsea Halprin, DO; Chelsea Hayes, MD; and
Ellen Klapper, MD*

Types of Autologous Transfusion 376
Preoperative Autologous Donation 376
Acute Normovolemic Hemodilution 379
Perioperative Blood Recovery 381
Summary 385
References 386

13. Complications of Therapeutic Apheresis 389

*Joseph R. Griggs, DO, FASCP, and Kendall P. Crookston, MD,
PhD, FCAP*

General Overview 393
The Role of Citrate in Apheresis 396
Hypovolemia and Vasovagal Reactions 406
Plasma Protein Depletion 408
Unusual and Controversial Complications from Apheresis . . . 413
Summary 419
References 420

14. Complications of Massive Transfusion 427

Kerry L. O'Brien, MD, and Lynne Uhl, MD

Hypothermia 428
Hemostatic Abnormalities 429
Laboratory Assessment during Massive Transfusion
Resuscitation 433

Transfusion Reactions

Management of Hemostatic Abnormalities 437
Metabolic Abnormalities 445
Immune Hemolysis 448
Air Emboli 450
Impaired Hemoglobin Function 451
Summary 453
References 453

15. Complications of Neonatal Transfusion 463

*Deborah A. Sesok-Pizzini, MD, MBA, and
Sarah Vossoughi, MD, RN*

Metabolic Complications 465
Immunologic Complications 483
Restrictive vs Liberal Transfusion Strategies 491
Summary 493
References 493

**16. Adverse Effects of Human-Derived Plasma
Derivatives 503**

Jacob Pendergrast, MD, FRCP(C)

Product Manufacture 504
Disease Transmission 505
Infusional Reactions 509
Headache and Neurologic Complications 511
Hemolysis 512
Allergic Reactions 516
Thrombosis 518
Circulatory Overload 524
Transfusion-Related Acute Lung Injury 525
Coagulopathy 526
Acute Renal Failure 529
Primary Hypotension 530
Summary 530
References 531

**17. Hemotherapy Bedside Biovigilance and Nursing Surveillance
in the Recognition, Reporting, and Management of
Transfusion-Associated Adverse Events 547**

*Chester Andrzejewski Jr, PhD, MD; Joan McGirr, RN, BSN,
ONC; and Elizabeth A. Henneman, PhD, RN*

Important Fundamental Concepts Regarding Blood
Components in the Evaluation and Management of
Transfusion-Associated Adverse Events 548
Care Map for Uncomplicated Transfusion Therapy 549
Care Map for Transfusions Associated with Adverse Events . . 557
Hemotherapy Documentation in the Electronic Medical
Record: A Potential Avenue for TAAE Occurrence
Mitigation 568
Commonly Encountered Issues and Questions 572
Summary 578
References 579

18. Preventing Transfusion Reactions 581

*James R. Stubbs, MD; Amy L. Mata, MS, MLS(ASCP)SBB;
and Camille M. van Buskirk, MD*

Transfusion Safety 581
Transfusion Practices 602
Now and the Future 625
Overall Transfusion Reactions Comparing Pathogen-
Reduced and Conventional Platelets 627
Summary 630
References 630

19. Hemovigilance 639

*Barbee I. Whitaker, PhD, and Paula H.B. Bolton-Maggs, DM,
FRCP, FRCPath*

Origins of Hemovigilance: Infection in the Blood Supply . . . 640
Systems and Networks 642
The Use of Hemovigilance Data to Address Serious
Complications of Transfusion 649
Twenty Years On: The Future of Hemovigilance 657
Summary 663
References 663

20. Acute Transfusion Reactions in Low-Resource Settings	673
<i>Heather A. Hume, MD, FRCP(C); Evan M. Bloch, MBChB, MS; Henry Ddungu, MBChB, MMed; and Isaac Kajja, MBChB, MMed, PhD, FCS(ECDA)</i>	
Background	674
Epidemiology of Acute Transfusion Reactions in Low- Resource Settings	676
Delayed Hemolytic Transfusion Reactions	689
Prevention of ATRs and DHTRs in Low-Resource Settings ...	689
References	692
Index	695