

IMMEDIATE NURSE / TRANSFUSIONIST ACTIONS!					IMMEDIATE TML ACTIONS!
1. <b>STOP</b> the transfusion. <b>Maintain</b> IV access. 2. <b>Assess</b> patient and check vital signs. 3. <b>Reconfirm</b> unique identifiers on patient ID band and TM label/tag. 4. <b>Notify</b> attending MRP and obtain management directives. 5. <b>Notify</b> Transfusion Medicine Laboratory (TML) of reaction. 6. <b>Send</b> order for transfusion reaction investigation to TML. 7. <b>Return</b> component/product, administration set/ fluids, transfusion label/tag to TML.					1. Perform Lab Clerical Check and Visual Plasma Check. 2. Collect post-transfusion sample where required. 3. Initiate serological testing where required.
FEBRILE REACTIONS	ALLERGIC REACTIONS	CHANGES IN BLOOD PRESSURE			RESPIRATORY REACTIONS
Temperature more than or equal to 38°C <b>AND</b> more than or equal to 1°C increase in temperature from pre-transfusion baseline; may have additional symptoms  <b>Potential causes:</b> - Febrile non-hemolytic transfusion reaction - Bacterial contamination - Acute hemolytic transfusion reaction	Rash, pruritus (urticaria); may be accompanied by erythema, flushing, shock, facial or airway swelling or additional symptoms  <b>Potential causes:</b> - Mild allergic reaction - Severe allergic reaction - Anaphylaxis	<b>Hypotension:</b> Systolic blood pressure drop of more than or equal to 30 mmHg below the pre-transfusion baseline†  <b>Hypertension:</b> Systolic blood pressure rise of more than or equal to 30 mmHg above the pre-transfusion baseline†  May have additional symptoms  †Definition refers to adult patients only			Dyspnea, tachypnea, hypoxemia, cyanosis, orthopnea, new chest x-ray infiltrates; may be accompanied by fever or changes in blood pressure  <b>Potential causes:</b> - TACO (Transfusion Associated Circulatory Overload) - TRALI (Transfusion Related Acute Lung Injury) - TAD (Transfusion Associated Dyspnea)
Signs and Symptoms		Timing	Possible Etiology	Recommended Investigations	Suggested Treatment and Actions
<b>FEVER:</b> Temperature more than or equal to 38°C <b>AND</b> more than or equal to 1°C increase in temperature from pre-transfusion baseline  <u>With/without:</u> Shaking Chills/Rigors  <b>Note:</b> Chills or rigors occurring in the absence of increase in temperature may classify as a febrile reaction and <b>MUST</b> be reported to TML.	<b>NO HEMODYNAMIC INSTABILITY, BLEEDING, HEMOGLOBINURIA OR OLIGURIA</b>  <b>TEMP less than 39°C</b> <u>With/without</u> Chills, nausea, vomiting  <b>OR</b> Chills/Rigors only	During or up to 4 hours post transfusion	Febrile non-hemolytic transfusion reaction	- Lab Clerical Check and Visual Plasma Check - Blood Group & DAT - Antibody screen if required	- Antipyretics (e.g. acetaminophen) - May restart transfusion cautiously, if less than 4 hours from issue time (with MRP order) - If recurrent reactions, can consider a trial of antipyretics prior to subsequent transfusions
	<b>TEMP more than or equal to 39°C</b> <b>OR</b> <b>TEMP increase more than or equal to 2°C from pre-transfusion baseline</b> <b>AND</b> <b>Any of the following symptoms</b> Hypotension, tachycardia, shock, dyspnea, shaking chills, rigors	Usually during first 15 minutes of transfusion  (Can occur up to 4 hours post transfusion)	Bacterial Contamination	- Lab Clerical Check and Visual Plasma Check - Blood Group & DAT - Aerobic and anaerobic blood cultures and gram stain on returned blood product - Aerobic and anaerobic blood cultures on patient	<b>DO NOT RESTART TRANSFUSION</b> - <b>Serious reaction, call the MRP and TML immediately</b> - Return blood to TML for clerical check and culture - If sepsis is suspected, broad spectrum IV antibiotics should be started immediately; DO NOT wait for culture results - Contact Transfusion Medicine Physician on call for additional assistance
	<b>TEMP increase more than or equal to 1°C from pre-transfusion baseline</b> <b>AND</b> <b>Any of the following symptoms</b> Hypotension, tachycardia, shock, dyspnea, shaking chills, rigors, anxiety, pain at IV site, chest pain, back pain, bleeding, oozing from IV sites (DIC), hemoglobinuria and oliguria	Usually during first 15 minutes of transfusion  (Can occur up to 4 hours post transfusion)	Acute hemolytic transfusion reaction	- Lab Clerical Check and Visual Plasma Check - Blood Group, DAT & Antibody Screen if required - Urinalysis (first void post-reaction) - Hemolysis work-up: CBC, bilirubin, LDH, AST, haptoglobin, reticulocyte count, peripheral blood film - If indicated, assess for: <ul style="list-style-type: none"> <li>Acute Kidney Injury: electrolytes, creatinine</li> <li>DIC: INR, PTT, fibrinogen, D-dimer</li> </ul>	<b>DO NOT RESTART TRANSFUSION</b> - <b>Serious reaction, call the MRP and TML immediately</b> - Check for clerical error at bedside - Aggressive hydration; maintain good urine output - Supportive care per MRP's discretion: IV fluid, vasopressors, oxygen, respiratory support - Monitor for hypotension, renal dysfunction, Disseminated Intravascular Coagulation (DIC) - If severe rigors, consider Meperidine (Demerol), if no patient contraindications - Contact Transfusion Medicine Physician on call for additional assistance

Signs and Symptoms		Timing	Possible Etiology	Recommended Investigations	- Suggested Treatment and Actions
<b>URTICARIA (Hives)</b>  <b>Rash and Pruritus</b>  <u>With/without</u>  Nausea, vomiting, abdominal cramps or diarrhea, dyspnea, hypoxia, chest pain, facial/upper airway swelling, hoarseness, stridor, wheezing, anxiety, feeling of impending doom	<b>NO CARDIORESPIRATORY SYMPTOMS</b>  Rash involving less than $\frac{2}{3}$ body, erythema or flushing	During or up to 4 hours post transfusion	Minor allergic	Lab Clerical Check and Visual Plasma Check	- Antihistamine (e.g. oral cetirizine) - With MRP order and if blood not expired (still less than 4 hours from start of original transfusion), may resume transfusion with close patient assessment - If recurrent/severe reactions, possible trial of antihistamine premedication
	<b>EVOLVING RESPIRATORY COMPROMISE OR HYPOTENSION REQUIRING SUPPORT</b>  Rash more than $\frac{2}{3}$ body, wheeze or angioedema with or without flushing/urticaria/rash	Often early in transfusion  During or up to 4 hours post transfusion	Severe Allergic	Lab Clerical Check and Visual plasma Check	- <b>DO NOT RESTART TRANSFUSION</b> - Antihistamine - May require IV corticosteroid - Consider trial of antihistamines prior to subsequent transfusions for recurrent reactions
	<b>MUCOCUTANEOUS SYMPTOMS ACCOMPANIED BY RESPIRATORY COMPROMISE AND/OR SEVERE HYPOTENSION</b>  <b>AND</b>  <b>REQUIRES URGENT CARDIORESPIRATORY SUPPORT</b>  - Hypotension, bronchospasm, stridor, angioedema, hypoxia - May be accompanied by altered consciousness or circulatory collapse	Often early in transfusion  During or up to 4 hours post transfusion	Anaphylaxis	- If DYSPNEA: chest x-ray - If HYPOXIA: blood gases - TML: • Lab Clerical Check and Visual Plasma Check <b>If indicated by Transfusion Medicine Physician on call:</b> • Group & Screen, DAT • Haptoglobin • IgA level (if pre-transfusion sample available) • Anti-IgA testing (performed via Canadian Blood Services, TML will assist in sending samples)	⚠ <b>Refer to Clinical Procedure (with Medical Directive): <a href="#">CS-CP-0014 Anaphylaxis – Identification and Initial Treatment – Acute and Continuing Care Settings</a> AND <a href="#">SHA 0232 Anaphylaxis Treatment Worksheet</a></b>  <b>DO NOT RESTART TRANSFUSION</b> - <b>Serious reaction, call the MRP and TML immediately</b> - Urgent airway and blood pressure support - EPINEPHrine - Consider IV steroid and antihistamines - Return blood to TML for clerical check - Pending outcome of investigations, washed/plasma depleted components - Contact Transfusion Medicine Physician on call for additional assistance

**NOTE:** For the management of minor allergic reactions, use of oral diphenhydramine (Benadryl®) for management of an allergic reaction is discouraged due its sedating side effects. This may cause somnolence and impair clinical assessment. If possible, use of an oral non-sedating antihistamine, such as cetirizine (Reactine®) or loratidine (Claritin®) is recommended. The onset of action of all oral antihistamine preparations is equivalent.

Signs and Symptoms	Timing	Possible Etiology	Recommended Investigations	Suggested Treatment and Actions	
<b>DYSPNEA</b> (shortness of breath)  <u>With/without</u>  <b>Hypoxemia</b> SpO2 (oxygen saturation) of 90% or less and a decrease of at least 5% from pre-transfusion  <u>With/without</u> Intervention required to maintain SpO2 (oxygen saturation)	<b>DYSPNEA</b>  <u>With/without:</u> Hypertension, tachycardia, orthopnea, cyanosis, increased venous pressure	During or up to <b>12 hours</b> post transfusion	TACO** (Transfusion Associated Circulatory Overload)	- Lab Clerical Check and Visual Plasma Check - Group & Screen, DAT - <b>Chest x-ray:</b> Possible findings – pulmonary edema, Kerley B lines, peri bronchial cuffing; may be pleural fluid - Brain Natriuretic peptide, NT pro-BNP (as available)  <b>DO NOT RESTART TRANSFUSION</b> - Oxygen, raise head to bed to 60 degrees or higher, diuretics (document fluid balance) - <b>FUTURE TRANSFUSION:</b> <ul style="list-style-type: none"><li>• Slow transfusion rate</li><li>• Transfuse one unit at a time</li><li>• Pre-transfusion diuretics***</li><li>• Consider TML to divide unit (as available)</li></ul>	
	<b>NO EVIDENCE OF CIRCULATORY OVERLOAD</b>  <b>ACUTE DYSPNEA</b>  <u>With/without:</u> Hypotension, Tachycardia, Fever	During or up to 6 hours post transfusion	TRALI (Transfusion Related Acute Lung Injury)	- Lab Clerical Check and Visual Plasma Check - Group & Screen, DAT - <b>Chest x-ray:</b> Findings – bilateral interstitial / alveolar infiltrates without evidence of circulatory overload - If hypoxia: blood gases - Canadian Blood Services requires follow up information & patient blood tests, contact TML, will assist in sending samples	<b>DO NOT RESTART TRANSFUSION</b> - <b>Serious reaction, call MRP and TML immediately</b> - Supportive care per MRP's discretion: oxygen, respiratory and circulatory support as needed - No evidence that steroids aid in management of TRALI - Contact Transfusion Medicine Physician on call for additional assistance
	Mild respiratory symptoms that <b>DO NOT</b> align with TACO, anaphylaxis, fever or TRALI	During or up to 24 hours post transfusion	TAD (Transfusion Associated Dyspnea)	- <b>Chest x-ray:</b> Findings - normal/unchanged from previous images, no pulmonary edema, no bilateral interstitial/alveolar infiltrates	<b>DO NOT RESTART TRANSFUSION</b> - Supportive care per MRP's discretion: oxygen, respiratory support
	<b>FEVER</b>  <u>With/without:</u> Hypotension	During or up to 4 hours post transfusion	Possible Etiology: - Febrile non-hemolytic transfusion reaction - Bacterial contamination - Acute hemolytic transfusion reaction	<b>Consider/Follow FEVER:</b> - Timing, Recommended Investigations, Suggested Treatment and Actions	
	<b>URTICARIA (RASH &amp; PRURITIS)</b> Airway or Facial Edema Hypotension	During or up to 4 hours post transfusion	Possible Etiology: Anaphylaxis	<b>Consider/Follow URTICARIA WITH DYSPNEA, HYPOXIA OR HYPOTENSION:</b> - Timing, Recommended Investigations, Suggested Treatment and Actions	

\*\*TACO: Pre-transfusion assess patients for TACO risk factors: predisposing age groups (<3 years or >60 years of age), history of myocardial infarction, left ventricular dysfunction, renal dysfunction, positive fluid balance

\*\*\*Pre-transfusion diuretics:

Furosemide PO: onset 30 to 60 minutes, maximal effect 1-2 hours, effect persists about 6-8 hours

Furosemide IV: onset 5 minutes, maximal effect 20-60 minutes, effect persists about 2 hours

Signs and Symptoms		Timing	Possible Etiology	Recommended Investigations	Suggested Treatment and Actions
<b>HYPOTENSION</b>  <b>Adults (more than or equal to 18 years of age):</b> - Drop in systolic BP more than or equal to 30 mmHg and systolic BP less than or equal to 80 mmHg.  <b>Children: Ages 1-18 years:</b> - More than 25% drop in systolic BP from pre-transfusion BP  <b>Ages 0-12 months or weight less than 12 kg):</b> - More than 25% drop from baseline blood pressure  <b>With/without</b> - Intervention required to maintain SBP	<b>With/without:</b> Facial flushing, abdominal cramps, dyspnea	During or up to 1 hour after stopping transfusion	Bradykinin mediated hypotension****	- Lab Clerical Check and Visual Plasma Check - Other lab testing as required	<b>DO NOT RESTART TRANSFUSION</b> - Supportive care per MRP's discretion: IV fluids - If taking ACE {angiotensin converting enzyme} inhibitor medication, consider an alternative anti-hypertensive agent prior to additional transfusions
	<b>FEVER</b> <b>With/without:</b> Dyspnea		Possible Etiology: - Bacterial contamination - Acute hemolytic transfusion reaction	<b>Consider/Follow FEVER:</b> Timing, Recommended Investigations, Suggested Treatment and Actions	
	<b>URTICARIA</b> <b>With/without:</b> Airway or facial edema, dyspnea		Possible Etiology: Anaphylaxis	<b>Consider/Follow URTICARIA WITH DYSPNEA, HYPOXIA OR HYPOTENSION:</b> Timing, Recommended Investigations, Suggested Treatment and Actions	
	<b>ACUTE DYSPNEA</b> <b>With/without:</b> Tachycardia, fever		Possible Etiology: TRALI	<b>Consider/Follow ACUTE DYSPNEA:</b> Timing, Recommended Investigations, Suggested Treatment and Actions	

#### \*\*\*\*Bradykinin mediated hypotension

Bradykinin is believed to have a major role in producing hypotension. Patients taking ACE {angiotensin converting enzyme} inhibitor medication - decreased bradykinin degradation related to increased angiotensin converting enzyme. Also, some individuals have genetic polymorphism leading to decreased bradykinin degradation.

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