

# PEARLS OF LABORATORY MEDICINE

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**TITLE: Transfusion associated circulatory overload (TACO)**

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**Slide 1:**

Hello, my name is <**Kerry O'Brien**>. I am an <**Associated Medical Director of the Blood Bank at Beth Israel Deaconess Medical Center in Boston, MA. I am also an Assistant Professor in Pathology at Harvard Medical School**>. Welcome to this Pearl of Laboratory Medicine on “**Transfusion Associated Circulatory Overload or TACO.**”

**Slide 2:**

At the end of this presentation, participants should be able to: Define TACO; identify the signs and symptoms of TACO; recognize the risk factors for development of TACO, formulate a differential diagnosis of TACO and create a plan for the prevention and management of transfusion associated circulatory overload.

**Slide 3:**

In 2011, transfusion associated circulatory overload was the second most common cause of transfusion-related mortality reported to the Food and Drug Administration next to transfusion related acute lung injury or TRALI. It is an underrecognized and underreported condition. The frequency varies from 1% in passive hemovigilance reporting to 8% in postoperative elderly patients to 11% in critically ill patients. A recent multicenter study utilizing active surveillance showed TACO to be widely underreported with a true incidence of 1.1%. In a recent prospective study of intensive care unit patients receiving blood products, 51 of 901 patients (6%) developed TACO.

## **Slide 4:**

The Centers for Disease Control's National Healthcare Safety Network Hemovigilance System (NHSN) has defined TACO as the new onset or exacerbation of 3 or more of the following within 6 hours of cessation of transfusion: Acute respiratory distress (defined as dyspnea, orthopnea or cough), elevated brain natriuretic peptide, elevated central venous pressure, evidence of left heart failure, evidence of positive fluid balance, and radiographic evidence of pulmonary edema.

## **Slide 5:**

Some signs and symptoms that may be present in a patient with TACO include: dyspnea, orthopnea, cyanosis, hypoxemia, elevated BNP, tachycardia, hypertension, pulmonary edema, pedal edema and cardiomegaly.

## **Slide 6:**

Several studies have published risk factors for TACO. These include the age of the patient, with elderly, infants and young children being at high risk. Additionally, patients with congestive heart failure, left ventricular dysfunction, chronic renal failure and a positive fluid balance are at increased risk. Patients receiving large volumes of plasma as well as those receiving blood products at a faster than usual rate are also at risk for circulatory overload.

## **Slide 7:**

The differential diagnosis for a patient presenting with respiratory distress following a blood product transfusion includes TACO, TRALI, anaphylactic or severe allergic transfusion reactions, as well as factors unrelated to the transfusion, such as pulmonary embolism, and coincident myocardial infarction. The next few slides will present distinguishing features of the three transfusion related diagnoses.

## **Slide 8:**

Patients with TACO may present with dyspnea, orthopnea and rales. These patients may show evidence of acute pulmonary edema with hypertension. They may additionally have tachycardia, a widened pulse pressure and a widened cardiac silhouette. TACO must present within 6 hours of cessation of the transfusion.

**Slide 9:**

Patients with TRALI can present with dyspnea, hypoxemia and acute pulmonary edema within 6 hours of transfusion as in TACO. However unlike in TACO, patients with TRALI demonstrate hypotension. They may or may not also have evidence of fever. There is also no improvement in symptoms following the administration of diuretics. TRALI is treated symptomatically with oxygen support.

**Slide 10:**

Patients suffering from anaphylactic transfusion reactions may demonstrate dyspnea, cyanosis and hypotension as in TRALI. These patients however, frequently have an erythematous rash, pruritis and nausea/vomiting. There is no pulmonary edema in anaphylactic reactions. There may be tachycardia along with shock. These reactions can occur within seconds of the transfusion and with as little as 10mL of blood product. Treatment involves stopping the transfusion and treating with oxygen and intubation as necessary. Epinephrine is the most effective initial medication for treating anaphylaxis.

**Slide 11:**

Prevention of TACO involves several steps: A careful review of the patient's history and fluid status is needed. Administration of diuretic therapy in high-risk patients should be considered. Ordering just 1 RBC unit for transfusion at a time is prudent practice. Decreasing the transfusion rate to 1 mL per kg per hour in at-risk patients is also a wise practice. Assessment of the risk versus benefit of the transfusion is also essential; a discussion with the patient as part of the consent for transfusion must include a discussion of the risks and benefits of transfusion .

## **Slide 12:**

Management of TACO reactions involves stopping the transfusion as soon as signs and symptoms suggest TACO. Patients should be treated with supplemental oxygen. An attempt may be made to reduce the intravascular plasma volume with diuretics. Placing the patient in a sitting position may be additionally helpful. If symptoms do not abate with the aforementioned steps, diuretics may be repeated. Therapeutic phlebotomy, while not commonly performed for this indication, may be beneficial in recalcitrant cases.

## **Slide 13:**

In conclusion, transfusion associated circulatory overload is an underrecognized and underreported complication of blood product transfusion. The elderly, patients with congestive heart failure, chronic renal failure, a positive fluid balance and those receiving large volumes of plasma, especially at a rapid rate, are at increased risk of this reaction. Transfusion of as little blood product as medically necessary, judicious use of diuretics and slowing the rate of transfusion in at-risk patients are helpful measures to prevent TACO.

## **Slide 14:**

When symptoms of TACO do occur, it is imperative to stop the transfusion immediately; provide the patient with supplemental oxygen as necessary; consider diuretics; and place the patient in a seated (head-raised) position. It is very important to notify the Blood Bank of the reaction.

## **Slide 15: References**

## **Slide 16: Disclosures**

**Slide 17: Thank You from [www.TraineeCouncil.org](http://www.TraineeCouncil.org)**

Thank you for joining me on this Pearl of Laboratory Medicine on “**Transfusion associated circulatory overload.**”

