A Retrospective Analysis of Venous Thromboembolism Trends in Chemotherapy-Induced Anemia: Red Blood Cell Transfusion Versus Erythrocyte Stimulating Agent (ESA) Administration

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Abstract:

Background: Anemia is a common and unfortunate consequence of chemotherapy; patients receiving a variety of chemotherapy regimens often develop chemotherapy–induced anemia (CIA), which contributes to poor outcomes including increased mortality. Prompt and effective treatment of CIA is essential to prevent fewer chemotherapy dose delays and reductions. Optimal therapy of CIA is controversial and involves the solitary and combined use of intravenous iron, red blood cell (RBC) transfusions, and erythropoietin stimulating agents (ESAs). Despite the baseline coagulopathies present in patients with malignancy, administration of both RBC transfusions and ESAs is associated with venous thromboembolism (VTE). It remains unknown whether the risk of VTE in patients with CIA is greater among patients who receive RBC transfusions or ESAs. **Methods:** A retrospective single-institution study analyzed 7360 patients with varying malignancies who developed CIA and received ESAs and RBC transfusion from 1998-2017. These patients were evaluated for subsequent development of VTE and categorized by prior receipt of RBC transfusion or ESA. **Results: (Figure 1)** Among the 7360 patients with CIA, 5503 received either RBC transfusion or ESA and 1857 received both. Among all patients, 3466/7360 (47.1%) developed a VTE. The absolute risk of developing a VTE with receipt of a RBC transfusion was 0.38 compared to 0.19 with ESA. Patients with CIA who received RBC had twice the risk of developing a VTE compared with those who received ESA ($p < 0.0001$). **Conclusions:** While both RBC transfusion and ESA administration are independently associated with VTE, our data suggests a greater risk of VTE development with RBC transfusion as compared with ESA administration.

Figure:

	VTE	No VTE	Absolute Risk
Receipt of RBC	3328	3308	
Receipt of ESA	1622	959	
Receipt of both RBC + ESA	1484	373	
Receipt of only RBC	**1844**	**2935**	0.38
Receipt of only ESA	**138**	**586**	0.19
Statistical Significance			Chi-square 104.01. $p < 0.0001$

Recent Publications:

Bryer EJ, Henry DH. Chemotherapy-Induced Anemia: Etiology, Pathophysiology, Therapeutics, and Implications for Contemporary Practice. **International Journal of Clinical Transfusion Medicine.** 2018 November; (6): 21-31. https://doi.org/10.2147/ijctm.s187569

Bryer EJ, Henry DH. Isolated hypoglossal nerve palsy as a presenting symptom of metastatic peripheral T-cell lymphoma-not otherwise specified (PTCL-NOS): A unique case and a review of the literature **International Journal of Hematologic Oncology.** 2018 June: 7 (1) Review. https://doi.org/10.2217/ijh-2018-0002

Bryer EJ, Medaglia JD, Rostami S, Hillary FG. Neural recruitment after mild traumatic brain injury is task dependent: a meta-analysis. **Journal of the International Neuropsychological Society.** 2013 August; 19(7):751-62. https://doi.org/10.1017/S1355617713000490. Epub May 9 2013. Review. PubMed PMID: 23656706

Bryer EJ, Henry D. Gestational Ovarian Choriocarcinoma: A Review of the Literature and Presentation of a Perplexing Case. **Gynecologic Oncology.** *November 2018, Under Review*

Bryer EJ, Hartner, L. The Heart of the Matter: A Unique Convergence of Cardiac Neoplasm, Hereditary Nonpolyposis Colorectal Cancer, and Spindle Cell Sarcoma. **European Medical Journal of Oncology**. *January 2019, Under Review*

Biography:



Dr. Emily Bryer is a physician in Philadelphia, Pennsylvania USA. She attended the Schreyer Honors College of The Pennsylvania State University for her undergraduate training where she served as President of Global Medical Brigades and established medical clinics in areas of Ghana, Honduras, Nicaragua, and Panama with limited access to medical care and healthcare resources. She received her medical degree from The Philadelphia College of Osteopathic Medicine before starting her Internal Medicine residency at Pennsylvania Hospital of the University of Pennsylvania. Her research interests include venous thromboembolism in chemotherapy-induced anemia and gestational trophoblastic disease.

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