

When Should I Transfuse? Restrictive Versus Liberal Red Blood Cell Transfusion Thresholds for Adult Cancer Patients

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BACKGROUND

- Anemic cancer patients comprise the largest “single” user of red blood cell (RBC) transfusions in the United States.
- The general trend outside oncology wards has been to use a more restrictive RBC transfusion hemoglobin threshold, but there is debate about how low hemoglobin levels need to drop before the administration of RBCs is indicated in this population.
- Current guidelines for red blood cell transfusion thresholds in anemic cancer patients are based on limited and outdated data.

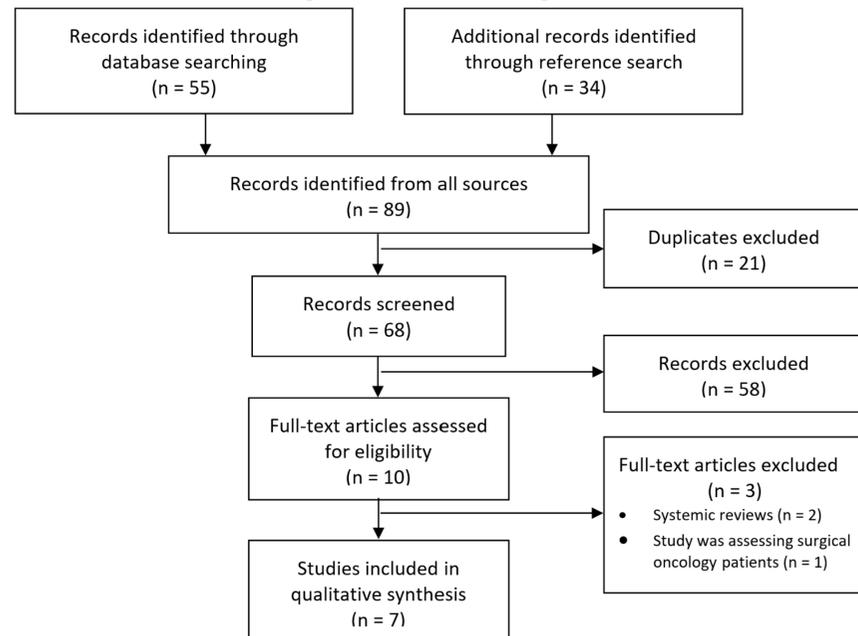
METHODS

- A search of the literature in PubMed/Medline and Embase was performed.
- Search terms included: (1) cancer AND (2) chemotherapy OR radiation AND (3) anemia AND (4) blood transfusion AND (5) liberal OR restrictive AND (6) survival OR quality of life OR transfusion reaction OR adverse effect.
- Inclusion criteria consisted of articles that investigated transfusion threshold impact on survival/mortality, quality of life, and/or transfusion reactions in adult patients with a diagnosis of cancer (solid or hematologic) who were receiving chemotherapy or radiation therapy.

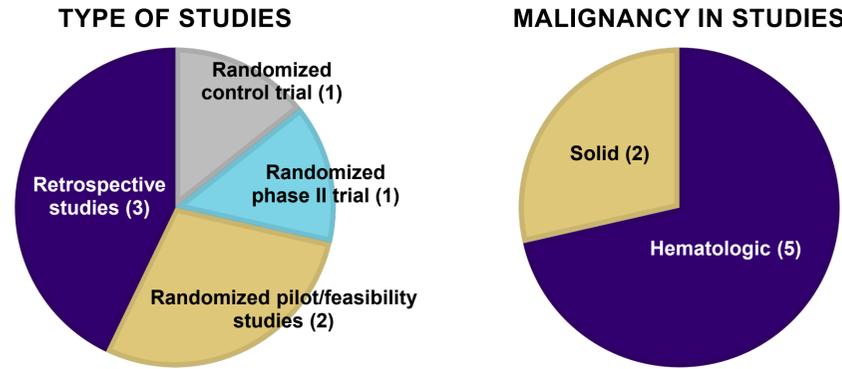
RESULTS

- 68 potential articles were identified. After screening and full-text review, 7 studies met the inclusion criteria for this narrative review (**Figure 1**).

Figure 1: PRISMA Diagram



- These 7 studies involved a total of 968 patients from 6 different countries that examined the association of restrictive versus liberal transfusion thresholds on: survival/mortality rates (6 studies), quality of life (4 studies), and/or incidence of transfusion reactions (2 studies).



- The transfusion threshold for restrictive groups ranged from a hemoglobin level of 7 to 10 g/dL and the transfusion threshold for liberal groups ranged from a hemoglobin level of 8 to 12 g/dL.

Table 1: Survival and/or Mortality

Study	Clinical Setting	Thresholds	Restrictive Group	Liberal Group
Tay et al. 2020	Any patients with a hematologic malignancy undergoing hematopoietic cell transplantation	Restrictive: 7.0 g/dL Liberal: 9.0 g/dL	2 deaths	4 deaths
Thorvaldsson et al. 2019	Patients with chronic lymphocytic leukemia diagnosis	Restrictive: 9.04 g/dL Liberal: 8.12 g/dL	Median survival 5.99 years	Median survival 5.83 years
DeZern et al. 2016	Acute leukemia patients with plans for inpatient chemotherapy	Restrictive: 7 g/dL Liberal: 8 g/dL	19% of patients survived past day 60	23% of patients survived past day 60
Patil et al. 2013	Multiple myeloma patients undergoing autologous peripheral blood stem cell transplantation	Restrictive: 7 g/dL Liberal: unknown	Day 100 mortality: 3/100 patients 1-year mortality: 8/100 patients	Day 100 mortality: 2/100 patients 1-year mortality: 11/100 patients
Park et al. 2008	Advanced gastric cancer patients receiving FU-based first line chemotherapy	Restrictive: 10 g/dL Liberal: 12 g/dL	Median survival 9.9 months	Median survival 9.3 months
Jansen et al. 2004	Newly diagnosed acute myeloid leukemia treated with combination chemotherapy	Restrictive: 7.2 g/dL for patients <25 years old 8.0 g/dL for patients 25-50 years old 8.8 g/dL for patients >50 years old Liberal: 9.6 g/dL	Mortality 1 (3%)	Mortality 1 (2%)

Table 2: Quality of Life

Study	Thresholds	Results Related to Quality of Life Index
Tay et al. 2020	Restrictive: 7.0 g/dL Liberal: 9.0 g/dL	The restrictive group was statistically noninferior to the liberal group at 100 days post- hematopoietic cell transplantation
Yakymenko et al. 2017	Restrictive: 9.7 g/dL Liberal: 11.5 g/dL for females, 13.1 g/dL for males	The quality of life domains were not significantly different between the restrictive and liberal groups
DeZern et al. 2016	Restrictive: 7 g/dL Liberal: 8 g/dL	No significant difference in fatigue between the restrictive and liberal groups (p=0.32)
Park et al. 2008	Restrictive: 10 g/dL Liberal: 12 g/dL	No relevant difference different between the restrictive and liberal groups

Table 3: Transfusion Reactions

Study	Thresholds	Restrictive Group	Liberal Group
Tay et al. 2020	Restrictive: 7.0 g/dL Liberal: 9.0 g/dL	7 (2.34%) transfusion reactions	5 (1.67%) transfusion reactions
Park et al. 2008	Restrictive: 10 g/dL Liberal: 12 g/dL	8 (19%) fever 8 (19%) allergy with urticaria 2 (5%) new alloantibodies	10 (23%) fever 9 (21%) allergy with urticaria 2 (5%) pulmonary edema 1 (2%) new alloantibodies

CONCLUSIONS

- There is limited and low-quality evidence that suggests the use of restrictive versus liberal red blood cell transfusion thresholds does not appear to impact survival/mortality rates, quality of life, or transfusion reaction incidence in anemic adult cancer patients undergoing myelosuppressive treatments.

FUTURE DIRECTIONS

- It would be beneficial to specifically investigate these transfusion strategies in anemic cancer patients with some of the more common malignancies such as lung, prostate, breast, and colon cancer.
- Additionally, it would be interesting to explore how these transfusion strategies impact clinical outcomes in the inpatient versus outpatient treatment settings.

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