

# Red blood cell units from female blood donors do not increase risk of death for transfused patients

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A study from Karolinska Institutet in Sweden sheds new light on the question of whether the sex and previous pregnancy of blood donors

affects survival in patients who receive red blood cell transfusions. According to the study, which is published in *JAMA Internal Medicine*, neither of these factors has such an effect, after accounting for the lower hemoglobin levels in blood from women.

Previous studies have returned conflicting results as to how the sex of the [donor](#) affects survivability in the recipient following the transfusion of [red blood cells](#). Some studies have indicated higher mortality in patients who have received red [blood](#) cells from women, in men who have received red blood cells from women who have been pregnant, and in sex-mismatched transfusions. Other studies, however, have not reported such correlations.

This question has now been further explored by researchers from Karolinska Institutet in a register study of almost 370,000 patients in Sweden who received a red blood cell transfusion for the first time between 2010 and 2018.

The aim of the study was to see how the sex and previous pregnancy status of the donor affects survival in the recipient within two years from transfusion. It also looked at how the risk of needing more transfusions differed between patients who received red blood cells from female and male donors. Blood from women on average contains less [hemoglobin](#) than blood from men, meaning that more transfusions might be required to obtain the desired level of hemoglobin in a recipient.

The study demonstrates that the median value for hemoglobin was lower in the female blood donors (135 g/l) than the male (149 g/l) and that patients who received blood from a woman had a 12% higher risk of requiring another transfusion within 24 hours than if the donor was a man. However, this sex difference was eliminated when adjusting for the donors' hemoglobin levels, which the researchers say was an expected effect that had not been factored into previous studies.

"When we take into account the lower hemoglobin levels in blood from women, we see no difference in survival among patients who received a blood transfusion from women compared with from men, regardless of how many times the female donors had been pregnant and of the patients' sex and age," says the study's first author Jingcheng Zhao, adjunct researcher at the Department of Medicine (Solna), Karolinska Institutet. "Differences in hemoglobin levels are a source of error that previous studies have not taken into consideration and that might explain the conflicting results that has been seen previously."

Data for the study was drawn from national population, health and blood donor registries.

The study also shows that donor sex is naturally randomly distributed in the patient material since no regard is paid to the sex and previous pregnancies of the donors by the blood donor centers when supplying blood. According to the researchers, this means that more far-reaching conclusions be drawn.

"It means that our results can be interpreted as if our study was a randomized controlled study, and that we can draw conclusions on causality," says Dr. Zhao. "We'll now continue developing methods for studying causal relationships in transfusion epidemiology using [observational data](#), on things like donor characteristics and how blood is handled. There's still much we don't know about blood [transfusion](#) and its effects."

One limitation is that it was not possible to separately study transfusions where the red blood [cells](#) had not undergone leukoreduction (the filtering out of [white blood cells](#)), since this procedure has been standard in Sweden since the 1990s. The researchers therefore add a caveat about generalizing the conclusions to erythrocyte concentrates that have not undergone leukoreduction, which, however, is relatively uncommon

now.

**More information:** Mortality Among Patients Undergoing Blood Transfusion in Relation to Donor Sex and Parity: A Nationwide Natural Experiment, *JAMA Internal Medicine* (2022). [DOI: 10.1001/jamainternmed.2022.2115](https://doi.org/10.1001/jamainternmed.2022.2115)

Provided by Karolinska Institutet

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