

# Massive Transfusion Protocol Ups RBCs, Plasma

BY SHERRY BOSCHERT

FROM A MEETING ON ANTEPARTUM AND INTRAPARTUM MANAGEMENT

**SAN FRANCISCO** — From the front lines of war comes a new protocol for preserving life during massive blood transfusion to treat maternal hemorrhage.

Physicians providing trauma care during the Iraq war noticed that giving fresh frozen plasma earlier to patients requiring massive transfusion and making a few other changes in conventional transfusion protocols decreased coagulopathy and improved the well-being of patients, Dr. Mark D. Rollins said at the meeting sponsored by the University of California, San Francisco.

Subsequent retrospective studies in civilians and a prospective study that was completed this year supported the military's suggestion that increasing ratios of plasma and platelets to red blood cells (RBCs) would improve survival in massive transfusions.

Responding to these new ideas, the California Maternal Quality Care Collaborative convened an Obstetric Hemorrhage Expert Task Force, which incorporated these cutting-edge recommendations into a free Obstetric Hemorrhage Toolkit (available at [www.cmqcc.org/ob\\_hemorrhage](http://www.cmqcc.org/ob_hemorrhage)).

"I'm not saying we have a ton of evidence," but the limited evidence available was sufficient to justify modifying protocols for managing maternal hemorrhage, said Dr. Rollins, an obstetric anesthesiologist at the university and a member of the California Maternal Hemorrhage Collaborative.

The military observations, published in 2007 (*J. Trauma* 2007;62:112-9), were followed by a retrospective study of 466 civilians who underwent massive transfusions at 16 U.S. trauma centers (*Ann. Surg.* 2008;248:447-59). That study found better survival using increased ratios of plasma and platelets to RBCs in massive transfusions.

Conventional guidelines called for a 1:3 ratio of plasma to RBCs, and the military called for a 1:1 ratio, with no recommendation for the ratio of platelets to RBCs. The civilian study found 30-day survival was 60% in patients who received more than 1 U of plasma or platelets with every 2 U of RBCs, compared with 40% survival with lower ratios of plasma or platelets to RBCs, so the investigators recommended a 1:1:1 ratio of plasma, platelets, and RBCs in massive transfusions.

A randomized, controlled trial of 214 civilian trauma patients, completed this year by Dr. Rollins and his associates, found significantly increased 30-day survival rates with higher ratios of plasma, platelets, or cryoprecipitate to RBCs in massive transfusions, defined as more than 10 RBC products transfused within 24 hours (*Transfusion* 2010;50:493-500).

Survival was 59% after transfusions with at least 1 U of plasma per 2 of RBCs, compared with 44% with ratios of 1:3 or more. For platelets, survival rates were 63% with at least 1:1 ratios, compared with 33% with ratios of 1:2 or more. Higher ratios of cryoprecipitate to RBCs improved survival, compared with lower ratios: 66% vs. 41%, respectively.

In developed countries, hemorrhage causes 13% of maternal deaths and is the third-leading cause of maternal death, with higher rates in other countries, according to a World Health Organization report (*Lancet* 2006;367:1066-74).

Death rates from postpartum hemorrhage have increased from approximately 2% in 1994 to 3% in 2006 in the United States, and from 4% to 5% in Canada during that time period.

"In the past couple of years, we've had two or three deaths right here in the San Francisco Bay Area in our hospitals from maternal hemorrhage," he said. ■

**Disclosures:** He reported having no conflicts of interest related to these topics.

## Managing Massive Transfusions

For best management of massive obstetric transfusions, consider these steps, Dr. Rollins said:

- Get into good communication with your blood bank, and ask for supplies for massive transfusions in packs of multiple units of RBCs and fresh frozen plasma—potentially even platelets—that arrive together. "This just helps remind everyone as those packs arrive that they should be giving the fresh frozen plasma with the red cells," he said. Make sure the blood bank knows exactly which room you're in.
- Have a team ready to mobilize, including a second anesthesiologist, a second surgeon, additional nurses, and runners for laboratory tests and blood products.
- Move expeditiously to an operating room if you're not already in one.
- If you're considering options such as interventional radiology, call those teams early to give them time to set up.
- Place large-bore IVs (16-14 gauge). "I like to think that goes without saying, but plenty of times I've had people come in with just 20-gauge IVs put in, and you can't transfuse enough through them to make a difference," Dr. Rollins said.
- Place invasive monitoring equipment.
- Repeat laboratory tests frequently, but don't wait for results to proceed with transfusion. Results will be useful later to assess how the case developed. Use point-of-care testing if it's available for faster results.
- Consider using fluid warmers and forced-air warmers to keep

patients from becoming hypothermic and more coagulopathic.

- Have rapid infusion pumps or pressure bags available to speed the transfusion.
- Prepare for general anesthesia.
- Have vasopressors and uterotronics immediately available.
- Have a supply of calcium chloride on hand to prevent the low levels of ionized calcium that can occur after rapid transfusion. Citrates in blood products bind with calcium, increasing the risk of extreme hypotension and depressed heart function.
- Have a Foley catheter (for measuring urine output) and compression stockings available.
- Reserve an ICU bed.
- Ask for additional packs of blood products if needed.
- Consider giving cryoprecipitate (fibrinogen less than 100 mg/dL).
- Consider off-label treatment with recombinant factor VIIa only after the patient has received approximately 10 U of packed RBCs and full factor replacement. "It's not a first-line drug. There's plenty of morbidity and mortality that can occur" with factor VIIa, he noted. "Having said that, I do believe that it is very effective in certain situations."
- Designate someone to tally and record the use of blood products and estimated blood loss.
- Bring the "code cart" into the OR early.
- Afterward, meet for 3-5 minutes with everyone who worked on the case to review what went well, what didn't, and ideas for improvement.

# Restless Legs Syndrome Affects 35%, Often in Third Trimester

BY BRUCE JANCIN

FROM THE ANNUAL MEETING OF THE ASSOCIATED PROFESSIONAL SLEEP SOCIETIES

**SAN ANTONIO** — Restless legs syndrome is extremely common in pregnancy, and one-third of affected women experience severe symptoms on four or more nights per week, according to a large prospective study.

Moreover, the presence of restless legs syndrome (RLS) doubles a pregnant woman's odds of experiencing poor sleep quality or poor daytime functioning, Dr. Qurralat Shamim-Uzzaman reported at the meeting.

These findings suggest targeting RLS offers potential opportunities to improve women's sleep

during pregnancy, according to Dr. Shamim-Uzzaman, a sleep medicine fellow in the department of neurology at the University of Michigan, Ann Arbor.

She presented a study of 1,489 women who were surveyed in their third trimester about their sleep. The validated screening questionnaires utilized in the study included a four-item Brief Restless Legs Scale, the Epworth Sleepiness Scale, and the General Sleep Disturbance Scale.

Thirty-five percent of the pregnant women reported having symptoms of RLS, typically peaking in the third trimester. Seventy percent of affected

women had symptoms 2 or more nights per week, and 16% experienced symptoms 6-7 nights per week. The prevalence of RLS in the general population of non-

### The presence of restless legs syndrome doubles a pregnant woman's odds of experiencing poor sleep quality or poor daytime functioning.

pregnant women has been pegged at 14%-16% in prior studies, suggesting that the rate more than doubles in pregnancy.

One of the questions the Michigan study set out to answer is whether the prevalence of RLS in pregnancy varies by race. This indeed proved to be

the case. The prevalence was highest in whites at 38%, compared with 27% in blacks and 33% in Asian-Indian women.

A score of 10 or more on the Epworth Sleepiness Scale, indicative of excessive daytime sleepiness, was achieved by 48% of women with RLS, compared with 38% without RLS. The

presence of RLS resulted in impaired daytime functioning. Poor daytime functioning was experienced by 67% of pregnant women without RLS, 69% with RLS symptoms less than 2 nights per week, and 87% of those with RLS at least 4 nights weekly.

In a multivariate regression

model that controlled for age, race, snoring, and body mass index (BMI), RLS was an independent predictor of poor sleep quality, with an associated twofold increase in the odds of experiencing poor sleep. Similarly, in an analysis that controlled for age, race, and BMI, RLS was an independent predictor of poor daytime function, with an odds ratio of 1.8. ■

**Disclosures:** Dr. Shamim-Uzzaman reported having no financial conflicts in connection with the study, which was funded by the University of Michigan Institute for Research on Women and Gender; the National Heart, Lung, and Blood Institute; and the Gilmore Fund.