



# Patient Blood Management: THE SOLUTION TO THE PROBLEMS WITH ANEMIA, BLOOD LOSS, AND TRANSFUSION

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According to the 2015 Global Burden of Disease Study in 2015,<sup>1</sup> 2.36 million individuals, or 32 percent of the world population, are suffering from anemia, a condition where the total amount of red blood cells (RBCs) is insufficient, thus lowering the ability of the blood to carry oxygen.

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This can lead to symptoms such as fatigue, weakness, infection, and heart failure. In hospitalized patients, anemia is even more frequent, with up to 75 percent of patients being diagnosed with the condition.<sup>2</sup> This is why clinicians are now concerned: A growing body of recent evidence has shown that anemia is an independent predictor for adverse patient outcomes. A meta-analysis looking into the association between anemia before surgery and mortality after surgery included 949,449 patients, 39 percent of whom were anemic. The results showed that anemia was associated with significantly increased perioperative mortality, acute kidney injury, infections, and, in cardiac surgery patients, stroke.<sup>3</sup> Another independent predictor with the same adverse patient outcomes is blood loss and massive bleeding.<sup>4</sup> For more than seven decades, the default therapeutic measure to treat anemia and blood loss was the transfusion of blood components.

According to the U.S. Department of Health and Human Services, transfusion was the most common procedure during hospitalizations in 2011.<sup>5</sup> However, beginning in the late 1990s, clinicians and researchers across different surgical and medical disciplines increasingly began questioning the efficacy of transfusion.<sup>6</sup> They realized that a blood transfusion should be viewed like any other organ transplant, with a negative impact on the recipient's immune system. Moreover, animal studies showed that stored blood undergoes numerous biochemical and biophysical changes, leading to the impairment of the blood circulation in the organs'

capillary systems.<sup>7</sup> More importantly, during the same time, the first clinical data were published, suggesting that patients receiving a transfusion might have a worse outcome compared to matched patients without transfusion.<sup>8,9</sup>

More than 20 years later, a huge body of scientific evidence demonstrates that transfusion, *per se*, is a major independent predictor for adverse patient outcomes including morbidity, mortality, and prolonged length of hospital stay.<sup>10</sup> This is why *Nature*, the international weekly journal of science, reported: “Transfusions are one of the most overused treatments in modern medicine, at a cost of billions of dollars. Researchers are working out how to cut back.”<sup>11</sup>

## PATIENT BLOOD MANAGEMENT

The right strategy to counteract this dangerous triad of anemia, blood loss, and transfusion is the evidence-based concept of Patient Blood Management or PBM. With this approach, the causes of anemia and bleeding of the individual patient are systematically identified and prevented or treated as quickly as possible. Depending on the patient, this may include measures to stimulate blood formation to increase the number of red blood cells, for example, by administering intravenous iron and other pharmaceutical agents, applying gentle surgical techniques, optimizing blood coagulation, recovering blood lost during surgery by mechanical means, reducing diagnostic blood draw volumes, and more. In addition, the indication for transfusion is scrutinized on a case-by-case basis and then made as restrictive as possible.

Using a combination of measures is associated with significantly better treatment results, which has been well-demonstrated in Western Australia. A statewide PBM program under the auspices of the Department of Health was established there, with the significant participation of globally recognized experts in the field. The results, with a total of 605,046 patients, show a 28 percent decline in hospital mortality, 21 percent decline in infection rate, and 31 percent reductions in stroke and myocardial infarction. Over a six-year period, transfusions were reduced by 41 percent. This led to a ratio of 19 units of RBCs issued per 1,000 population, while, for instance, the ratio in the United States was still above 40 RBC units per 1,000. The program also achieved cost reductions of more than 80 million Australian dollars and contributed to a 15 percent decrease in average hospital length of stay.<sup>12</sup>

To sustainably improve safety and quality in the Australian health care sector, PBM has now also been declared a national priority, and since 2019, PBM guidelines have been mandatory for Australian hospitals. In China, Mexico, South Africa, South Korea, Switzerland, and several European Union countries, officials are now trying to disseminate and implement PBM as a new standard of care. In Italy, there has been a 2017 decree that calls for the application of the PBM for planned surgical

interventions. Medical law experts therefore recommend that PBM be included in patient education. Since 2010, PBM is also recommended by the World Health Organization.<sup>13</sup> ●

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