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## Summary of Bloodless Medicine and Surgery Methods and Results

We would like to shed light on how we manage patients when they don't accept blood transfusions, at the Johns Hopkins Hospital and at many hospitals across the world. Most of these patients decline blood due to personal or religious reasons, and are willing to sign an informed consent stating specific transfusion alternatives they will accept.<sup>1</sup> Patients who are Jehovah's Witnesses represent the majority of these "bloodless" patients.

Over the past two decades, we have learned much about effective methods of treatment that result in excellent clinical outcomes,<sup>2</sup> while avoiding transfusions. In fact, these methods of blood conservation are so beneficial they are being used even for patients who accept blood, to reduce avoidable transfusions, thus saving blood and money.<sup>3</sup> Our group at Johns Hopkins has now published 12 peer reviewed manuscripts on this topic in the past 10 years, and we would like to share with the public what we have learned along the way.

Ten or twenty years ago, some clinicians were unsure about management techniques when patients declined transfusion. But now we have a host of blood conservation methods that result in either the same, or better outcomes, compared to patients who accept blood. These methods are summarized in Table 1 which has appeared in various forms in several of our recent publications.<sup>2,4-7</sup>

**Table 1.** Blood conservation techniques used in bloodless medicine and surgery programs.

<b>Bloodless Medicine Techniques</b>	
Preoperative	<ul style="list-style-type: none"><li>• Diagnosis and treatment of preoperative anemia</li><li>• Management of iron deficiency</li><li>• Discontinuing anticoagulants appropriately</li></ul>
Intraoperative	<ul style="list-style-type: none"><li>• Maintaining perioperative normothermia</li><li>• Intraoperative autologous cell salvage</li><li>• Intraoperative acute normovolemic hemodilution</li><li>• Controlled hypotension</li><li>• Topical hemostatic agents</li><li>• Antifibrinolytics (tranexamic acid, aminocaproic acid)</li><li>• Minimally invasive surgical techniques</li><li>• Point-of-care coagulation testing (viscoelastic testing)</li></ul>
Postoperative	<ul style="list-style-type: none"><li>• Decreasing the frequency of blood draws</li><li>• Utilizing pediatric-sized phlebotomy tubes</li><li>• Tolerating lower hemoglobin levels</li><li>• Inline blood return devices for arterial and central venous catheters</li></ul>

When pediatric patients present, belonging to Jehovah's Witness parents, special considerations apply, and we have published our management strategy with a very successful approach and excellent clinical outcomes.<sup>8,9</sup> We inform the parents all the methods of blood conservation we plan to use, which are

applicable to the specific case (from Table 1), while we also inform the parents that we will administer a transfusion in the exceptional case where we consider it to be medically necessary.

With this approach, blood transfusions were avoided in almost all of the pediatric cases.<sup>9</sup> There were no deaths over the 4-year period in our series of cases. The clinical outcomes were either the same or better for these children in our study compared to those who received standard care including allogeneic blood transfusion (someone else's blood). Composite morbidity rates were less than half in the bloodless group (2.6%), compared to the standard care group (6.2%);  $P = 0.035$ . Mortality was not statistically different in the bloodless (0%) vs. the standard care (0.9%) group ( $P = 0.43$ ).

In summary, we recognize through experience and from published findings, that patients can be successfully managed without transfusions when they decline them, and that both adult and pediatric patients have excellent outcomes when cared for properly.<sup>2,9</sup> This field is no longer new, and the methods of blood conservation are being used and perfected across the world. At major medical conferences around the world, information is being shared through educational sessions to help clinicians manage these patients.<sup>10</sup>

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Yours very truly,



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