

Are Transfusions Overrated? Surgical Outcome of Jehovah's Witnesses

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Physicians as well as their patients are quite familiar with the ever growing list of complications of transfusion. Blood is usually administered by physicians with the nearly unchallenged view that failure to transfuse would have dire consequences. Evidence supporting that view is very difficult to obtain. Although no controlled trial exists, data are collected from 16 reports of the surgical outcome of a series of patients of the Jehovah's Witness faith who were not given transfusion for operations during which transfusion is typically given. Analysis of these data supports the concept that approximately 0.5% to 1.5% of such operations are complicated by anemia resulting in death. This risk of not transfusing patients must be weighed against the cost, morbidity, and mortality that would be expected to accrue had these patients been transfused. These concepts should be employed whenever one is formulating a risk-benefit ratio for patients for whom transfusion is contemplated.

A time-honored method to assist physicians' decision making is the risk-benefit ratio. Minimizing risk and maximizing efficacy improve the likelihood of a good response. Whereas risks of transfusion are frequently addressed, little information is available regarding the benefit of this common practice. This report will discuss the apparent safety of not transfusing members of the Jehovah's Witness faith undergoing surgery.

Physicians are aware of the risks of transfusion. By summing a myriad of complications, Walker [1], in a 1987 review, concluded that each transfusion event has an aggregate 20% chance for some adverse reaction, some of which are minor but others deleterious. Although the risk of transfusion-acquired hepatitis and acquired immunodeficiency syndrome is decreasing, other "new" risks of blood transfusion have been described. Heretofore unknown viruses are being described in blood and are of unknown importance. There is increasing evidence that blood transfusions received in the perioperative period for cancer surgery have adverse effects on disease-free survival and overall survival. This unexpected risk remains unsettled and controversial and has been critically reviewed by van Aken [2]. The attending physician should be assured his prescribed transfusion in a cancer patient has uncontested benefit, if he recalls that in one study using multivariate techniques regarding tumor recurrence and death rates in patients following colorectal cancer surgery, transfusion was the single most important predictor for poor outcome [3].

Transfusion may have other negative impacts on patients with complex conditions. In studying the outcome of patients undergoing major abdominal surgery, Maetani *et al* [4] found the highest risk factor for developing organ system failure was blood transfusion. Their system analysis corrected for variables such as blood loss or severity of injury. Postoperative septicemia has been found to be highly linked to transfusion practice in a recent large study by Wobbles and colleagues [5]. Those who received 3 or more units of red blood cells were at a much higher risk ($p = 0.003$) to develop septic complications than those not receiving transfusions. Although it is possible that other factors such as severity of illness and other confounders are op-

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TABLE I

Jehovah's Witnesses Undergoing Major Surgery Without Blood Transfusion

Reference	Procedures	No. of Operations	Deaths Associated With Anemia
[8]	Cardiovascular	542	15
[9]	Cardiovascular	36	3
[10]	Total hip replacement	107	0
[11]	Total hip replacement	100	0
[12]	Obstetrics/gynecology	165	0
[13]	General surgery	96	0
[14]	Pediatric cancer	27	0
[15]	CABG	9	0
[16]	CABG	46	0
[17]	Renal transplantation	13	0
[18]	Pediatric cardiovascular	11	0
[19]	Cardiovascular	30	0
[20]	General surgery	13	0
[21]	General surgery	78	1
[22]	Pediatric cardiovascular	112	1
[23]	Spinal fusion	19	0
Total		1,404	20 (1.4%)

CABG = coronary artery bypass grafting.

erative, such complications of transfusion are infrequently considered at the time of ordering blood.

Graft-versus-host (GVH) reactions following transfusions are not limited to the extremely immunocompromised patients such as those undergoing bone marrow transplantation. In a thorough 1990 review of this subject by Anderson and Weinstein [6], immunocompetent patients have been found to develop transfusion-related GVH.

If transfusion has an aggregate potential risk of 20% per transfusion, then what guarantee is there that transfusions are of such benefit that these risks are justified and acceptable? In a recent survey on transfusion decision making, the risks of transfusion were recognized; however, most unnecessary transfusions appear to result from excessive and unfounded fear of the risk from not transfusing. These same researchers pointed out that a physician's confidence in his or her decisions regarding transfusion ordering was inversely related to the practitioner's actual knowledge of transfusion medicine [7]. They suggested that changing a physician's ordering habits would probably be better effected by information on the limited benefit of transfusion rather than by further knowledge of the risk of transfusion.

Perhaps the closest example of a trial proscribing the use of blood is that of the surgical outcome of Jehovah's Witnesses. This religious group does not allow transfusions, even autologous transfusions, to be administered to members of their congregation. They otherwise are totally within the mainstream of modern medicine. There is no reason to think they are more or less healthy than the average patient. Therefore, comparison of their outcome to

that of other patients undergoing surgical procedures usually associated with transfusion serves a purpose. It is not the aim of this paper to agree or disagree with the ecclesiastical basis of their practices nor to address medical, legal, or ethical issues.

Reports of surgical experiences in Jehovah's Witnesses published from 1983 to 1990 were sought by way of a MEDLINE search. Sixteen reports [8-23] of series involving 9 or more patients undergoing major surgery for which 2 to 6 units of blood are typically transfused were found. In most reports, the patients were not preselected and represented consecutive or total experience with patients who were Jehovah's Witnesses. In all reports, the patients' religious views were not violated by transfusion and the care of minors was not obfuscated by court orders or the like [14,18,22]. The pediatric heart bypass papers [18,22] are of particular interest in that very low intraoperative hematocrits were observed after crystalloid priming of heart-lung bypass apparatus. Despite as much as 150 mL/kg of crystalloid administered, neither edema of lungs, periphery, or brain nor coagulopathy was observed. In procedures using normovolemic hemodilution techniques, intraoperative hematocrits of 15% are typical and tolerated without ill effects [14].

Although no study was a double-blind control study (neither the Jehovah's Witnesses were willing to receive blood nor were most surgeons willing to withhold blood for non-Jehovah's Witnesses), one study [11] did compare 100 operations for total hip replacement in Jehovah's Witnesses with 100 patients who were not Jehovah's Witnesses and were of the same age, sex, and health status undergoing the same operation by the same orthopedists. Most Jehovah's Witnesses admittedly underwent surgery using hypotensive anesthesia techniques whereas the other patients underwent normotensive surgery. Blood loss was significantly less and operative time was shorter for the Jehovah's Witnesses. The overall morbidity and mortality of both groups were the same. These elderly Jehovah's Witnesses did not experience an increase in stroke, myocardial infarction, or renal failure, despite an average blood loss of 5 units.

These 16 studies reported a wide variety of surgical procedures for a total of 1,404 operations (Table I). Each study reported the morbidity and mortality of those procedures. The authors implicated a lack of blood as the primary cause of death in 8 patients (0.6%) and contributing to death in another 12 patients, yielding a total of 20 deaths (1.4%). In addition to the low number of deaths recorded in these 16 reports, strokes, myocardial infarction, acute renal failure, postoperative infection, delayed wound healing, or other maladies were not increased in Jehovah's Witness patients compared

with other patients. Length of stay for these patients was not increased.

Nelson and Bowen [11] implied that by not transfusing the 100 Jehovah's Witnesses undergoing total hip replacement, at least 200 units of blood were not infused. This conservative amount of blood represents a sizeable expense spared. More importantly, 20% of the 1,404 patients (281) unknowingly avoided some complications by way of avoiding transfusion [1].

Are the benefits of transfusion greatly overrated? If not transfusing Jehovah's Witnesses actually results in little acute extra morbidity and mortality and avoids a significant amount of costs and chronic complications, should patients receive fewer transfusions? Indeed, authors of these very reports have raised this question and have extended these practices (i.e., fewer or no transfusions and the use of normovolemic hemodilution and hypotensive anesthesia) to their routine patients [14,16,19,22]. The Jehovah's Witness patients' decision to forego transfusions for major surgical procedures appears to add 0.5% to 1.5% mortality to the overall operative risk. Less clear is how much morbidity and mortality are avoided by this practice, but they probably exceed the risk of not being transfused. The impact on the overall morbidity and mortality is not known; such a study would take decades of observation with large numbers of randomized patients and is unlikely to ever be done.

Patients now often question the risk of transfusion, voicing their desires to minimize exposure to blood products. In discussing transfusion with these patients, physicians should remember the experience of Jehovah's Witnesses. Rather than reflexively administering blood, physicians must consider the risk-benefit ratio as they would for any drug or procedure.

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