

# **THE HISTORY OF BLOOD TRANSFUSION IN SUB-SAHARAN AFRICA**

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# INTRODUCTION

The history of blood transfusion is a subject of interest to historians of medicine and scholars of Africa, as well as those who work in and follow developments in global health. Like today, the introduction of new medical practices in Africa at the beginning of colonial rule held great promise for generally improving health. In the case of transfusion, as this study shows, there were advances to be sure, but also some setbacks. Most important, blood transfusion could not be put in place quickly or exactly as it was practiced in the countries of Europe or in other developed countries. The procedure required some important modifications in order to be widely practiced in Africa; hence, its history offers many lessons for those currently interested in economic development and global health.

## *Blood Transfusion and the Origin of AIDS*

This book grew out of the response to a question from colleagues studying the origin of AIDS. As is often the case with unexpected epidemics, the most immediate concern was about the cause of the disease after it was identified in 1981. Once that cause was discovered a few years later, an extensive search began for the origin of the virus. Despite speculation about such things as conspiracies, fallout from germ warfare research, and divine retribution, by the late 1980s virologists identified simian immunodeficiency viruses of chimpanzees and monkeys in Central and West Africa as the antecedents of the human immunodeficiency viruses that caused AIDS.<sup>1</sup>

One important feature of simian viruses, however, complicated the question of the origin of AIDS. According to scientists, the simian viruses from which the human immunodeficiency viruses (HIV-1 and HIV-2) were adapted have existed in African chimpanzees and monkeys for thousands of years. Moreover, humans have long had contact with these animals as sources of food and pets, but a person can tolerate relatively well a simian virus infection from cuts or bites.<sup>2</sup> So the question was, why did the adapted human immunodeficiency viruses become pandemic only in the last thirty years?<sup>3</sup>

Blood transfusion was not the first explanation suggested; rather it was that a chance, random mutation produced the particularly deadly HIV virus. This theory was reinforced by early evidence that suggested the human virus was new. An extensive search for human tissue and serum found that the earliest sample infected with HIV antibodies was from 1959.<sup>4</sup> Using this sample and multiple other later ones, researchers have taken advantage of the fact that HIVs mutate at a predictable rate so that they can compare the changes in DNA sequences of the HIV samples and estimate approximate dates of their common ancestor virus. Accordingly, they have estimated that the oldest human immunodeficiency virus dates from the period between 1921 and 1933.<sup>5</sup>

Even if this human virus is of relatively recent origin, the problem with the random-mutation explanation is that a dozen other human immunodeficiency viruses have been discovered that have also adapted from simian ones and from regions as far away as a thousand miles.<sup>6</sup> This has led many researchers to seek another explanation of what changed to make it possible for the simian viruses to begin adapting into human ones at different locations in Africa in the first half of the twentieth century.

The most obvious source of change in much of sub-Saharan Africa at the end of the nineteenth and beginning of the twentieth century was the establishment of European colonial rule. Some provocative hypotheses have been offered to explain the specific developments that could have increased the opportunities for adaptation of viruses as well as their epidemic spread. For example, demographic and social change, or altered patterns of environmental exploitation could have increased passage of viruses from simians to humans or between humans.<sup>7</sup> These suggestions have usually been found in concluding sections of articles on the scientific basis of dating the emergence of viruses, although two recent book-length treatments of the origin of AIDS have summarized, and in one case attempted to analyze, them.<sup>8</sup> These are broad generalizations requiring detailed research to be verified. In addition, these explanations have usually been suggested by scientists, only a few of whom have actually ventured into archives, but none with historical training in the critical evaluation of sources.<sup>9</sup> Therefore more serious scholarship by historians is essential before drawing any conclusions.

My colleagues' theory was that the multiple adaptations were facilitated by new, albeit unintentional means of transmitting disease between humans in Africa in the last century. Their research focused initially on the use of insufficiently sterilized needles in mass campaigns against disease that began during colonial rule, in order to show that this might have been a new way

for someone infected with a simian virus to transmit it to another person. They maintained that this so-called serial passage increased the chance for the adaptation of new human immunodeficiency viruses.<sup>10</sup> These results raised the question of whether another otherwise lifesaving procedure, blood transfusion, began early and frequently enough in Africa also to have facilitated adaptation of SIVs to new HIVs and their epidemic spread. In this case even less frequent use of transfusion might have had a greater impact because of its unparalleled efficiency of transmitting disease, nearly 100 percent. To their credit, they recognized their limitations as historians, and they sought additional expertise.

### *Africa and the History of Transfusion*

My colleagues' ignorance of the history of blood transfusion in Africa was not just the result of their lack of historical training. In fact, there has been very little written on Africa even though the history of blood transfusion has been told many times in many ways. Its role as a reanimating force—still the term used by French transfusion services—is perhaps the earliest characterization, dating back to the sixteenth century, and it continued into the nineteenth century, for example in an 1804 English caricature of Napoleon receiving injections of courage from the blood of a tiger.<sup>11</sup> At the beginning of the twentieth century, transfusion was described as a “miracle of resurrection” by George Crile's wife, who assisted at one of his first successful transfusions.<sup>12</sup>

Most histories of transfusion have emphasized technical discoveries. A classic case is the first chapter of Geoffrey Keynes's *Blood Transfusion* (1922),<sup>13</sup> which describes the attempts beginning with Richard Lower in England and Jean-Baptiste Denys in France in the 1660s, following William Harvey's discovery of blood circulation. Keynes also mentions the efforts of James Blundell in the first part of the nineteenth century, but the main purpose of the book is to demonstrate the much more successful techniques discovered after 1900, which were first used on a large scale during the Great War (1914–18), in which Keynes (whose older brother, John Maynard Keynes, was the famous economist) had recently served. Subsequent histories, usually in the form of articles or introductory chapters of transfusion texts, have also focused on new techniques developed during the rest of the twentieth century.<sup>14</sup> Those histories freely skipped around time periods and locations to document the discoveries and innovations of those who built on their predecessors around the world to perfect the increasingly important medical procedure.

This book differs from most of those histories in its focus on one geographical area. Only recently have there been such histories—for example Susan

Lederer's *Flesh and Blood* (2008), which examines the history of both organ transplantation and blood transfusion in the United States.<sup>15</sup> That book illustrates one reason for focusing on a specific geographical area: it permits greater detail about how a medical procedure such as transfusion is affected by and has a broad impact on society. This might be true for other medical procedures, yet for blood transfusion it is especially interesting because the main therapeutic "medicine" is blood from another person. The impact of transfusion is dramatic and lifesaving.

In addition, a geographical focus makes it possible to identify features of the practice that are peculiar to that setting, hence it is useful for comparative study. The conditions in sub-Saharan Africa were so different from those in the United States or Europe that one can easily see the value of identifying what was similar and what was different in its history. For example, the fact that there was no analogous treatment in traditional African medicine meant that the introduction of blood transfusion offers an excellent case of how modern biomedicine is adopted or modified in settings outside modern societies, a question of great importance in global health today. Sub-Saharan Africa, for purposes of this study, includes all of Africa south of the Sahara, with the exception of South Africa, where the very different political, social, and demographic circumstances of white rule, especially after 1900, produced a health system that was very different from the rest of sub-Saharan Africa. For example, a 1975 editorial in the *South African Medical Journal* reported that 86 percent of blood in South Africa was donated by whites, while at least 60 percent of patients were estimated to be black.<sup>16</sup>

### *Approaching the History of Transfusion in Africa*

The research for this book is an attempt to help answer the question about the role of transfusion in the origin of the AIDS epidemic by showing in detail when, where, and how blood transfusion was introduced to Africa.<sup>17</sup> Because there is very little scholarly study of the subject, another goal of this book is to describe the major changes in the introduction and expansion of blood transfusion from the first reports of the practice, during colonial rule in the 1920s, to independence and the appearance of AIDS, at the end of the twentieth century. But blood transfusion is not a remote, detached medical procedure. On the contrary, it requires people to have blood taken from them, as well as patients willing to have the blood of others placed in their bodies. As a result, the history of blood transfusion reveals a number of features of African societies that adopted this novel medical treatment, including who donated blood, the uses

of transfusion, the question of risk from contaminated blood, and the extent to which transfusion might have spread HIV and other diseases.

The sources used for this history include the records of most of the colonial powers in Africa—Britain, France, and Belgium—as well as several European Red Cross societies and the International Federation of Red Cross and Red Crescent Societies (IFRC). Major medical libraries and archives around the world also provided published and unpublished reports of the African health services, and four African countries provided surprisingly good records of hospital and transfusion services. A number of former health officers who worked in Africa were of great assistance in answering questions and occasionally providing more detailed histories of their service.

There are limits worth noting in a book of this scope. First is the difficulty in providing enough depth of analysis for an area so large and diverse as sub-Saharan Africa. Even limiting the study to the British, French, and Belgian colonies, it is impossible to give the depth of treatment that all colonies warrant. In an effort to resolve this problem, Kenya, Uganda, Senegal, and the Congo/Zaire<sup>18</sup> have been chosen for more extensive examination because of their size, geographical variety, and availability of records. Hopefully subsequent studies will follow on these and other histories. A second problem is the lack of records about the Africans who made up the donors and patients. This book does not pretend to be a social history of transfusion, but it is hoped that indirect evidence from numbers and observations will provide enough detail to represent not only the subjects of transfusion but also in this case the source of the “medicine” (blood) for treatment. Finally, and related to the previous point, this subject risks amplifying the divide and stereotypical differences between Western and traditional medicine. To be sure transfusion was not a practice with any analog in traditional African medicine, but that does not mean that opposition or incompatibility were inevitable. In fact, a major finding is that transfusion was adopted quickly and with relatively little resistance. Moreover, there were definite differences in the practice in Africa compared to Europe and elsewhere, such as securing donors and uses of transfusion, which means that this was not a simple process of adoption of Western medicine.

The essential requirements for transfusions to begin in Africa were doctors trained in the techniques, donors, and patients in need of and willing to receive transfusions. The first reports in Africa were in the early 1920s, and organized transfusion practices had been developed before the Second World War. The records between the two world wars show not only that all conditions existed in sub-Saharan Africa that were necessary for blood transfusions; they also

suggest that the numbers were limited primarily by the availability of Western medical doctors and facilities to do transfusions. There is also an indication of how innovation took place, usually through connections to people and resources outside the usual colonial medical structures, for example, the Red Cross, missionaries, universities, and mining companies.

Transfusion became a regular part of modern medical treatment in sub-Saharan Africa from 1945 to independence. The means by which this occurred differed significantly according to the colonial ruler. For example, in francophone Africa the government attempted to implement a policy of centralized blood collection in Dakar, Senegal, to supply blood to all colonies in French West Africa. In the British and Belgian colonies local initiatives and the Red Cross were much more important in creating transfusion services. In Uganda, this practice led to the Red Cross expanding the number of collection centers from the capital, Kampala, to other regions of the protectorate. The common underlying reason for growth everywhere was the Africans' acceptance of donating and receiving blood. Equally important were the increased expenditures in colonies on health, particularly new hospital construction, because transfusions were done in the hospital setting. In addition, new and simpler techniques developed during the Second World War made transfusion easier to practice in sub-Saharan Africa.

Following independence, in the 1960s, transfusion continued to grow in Africa and the organization of services entered a new phase. Most newly independent countries accelerated expansion by building provincial and district hospitals to serve regional and local needs. These hospitals usually had the ability to do transfusions, but with only a few exceptions governments left it to the local hospitals to arrange for their own blood collection, sometimes with the assistance of the Red Cross and unpaid donors, sometimes with a paid service, and sometimes both. Thus, there was a general swing away from centralization and its high costs, toward a mixed organization with at best limited regional services, but also hospital-based means to supplement or complement the collection, testing, and distribution of blood for transfusion. Hospitals thus developed a number of options for blood collection, all of which were driven by an increase in the use of transfusion for medical care and the corresponding need for more donors.

The final phase in the development of African transfusion services began after the economic crisis of the mid-1970s, when African countries were unable to provide resources to continue, let alone keep up with, new techniques in transfusion medicine. This constraint limited their ability to draw and store



blood or extend transfusion to more remote regions. Problems were exacerbated by growing concerns with testing and safety, such as the need to screen for hepatitis B, a new disease that was discovered well before the appearance of HIV. One response was to seek funding from developed countries, especially in Europe, North America, and in Japan. When successful, the result was a recentralization of transfusion services because donor countries found that it was more efficient and safe and gave them better ability to monitor how funds were used. For example, foreign assistance in Burundi and Rwanda followed this pattern, as did Ethiopia, but not all countries were able to secure outside funding. Other pressure for centralization came from the growth of programs at the World Health Organization and the International Red Cross, both of which helped secure funding and coordinated offers of technical assistance for setting standards of blood safety beginning in the mid-1970s. They also co-sponsored the first African blood transfusion workshops, beginning in Burundi in 1976 and the Ivory Coast in 1977. Thus, when the AIDS crisis hit Africa, less than a decade later, mechanisms to support and coordinate efforts to monitor and insure a safe blood supply were already in place.

Three crucial features of blood transfusion in Africa are particularly noteworthy compared to elsewhere: what transfusions were used for, who donated blood, and safety. One surprising finding is that reluctance of patients to receive the blood of others offered relatively little impediment to the adoption of transfusion in Africa. To be sure, as elsewhere, there were fears and myths that arose and for the most part were allayed by practitioners. Moreover, the needs were so extensive, and the successful results of transfusion were so dramatic, that if anything, the overuse of transfusion became a bigger problem than resistance on the part of patients. Hospital records are scarce in the early period, but after the 1980s statistics show that transfusions were done increasingly for maternity and pediatric (anemia) use. Other evidence of the uses of transfusion includes posters from the Red Cross archives, which, in an effort to encourage Africans to donate blood, prominently featured how the blood would be used.

Another surprising conclusion is that sufficient donors were generally found in Africa so that the blood supply was able to meet the growing use of transfusion. The best explanation for this success in meeting the need for blood donation was the flexibility of these practices. Most notably, hospitals were innovative in how they adapted to their circumstances in order to secure blood donors. This pragmatism ran counter to some expectations of resistance and irrational opposition by Africans. One way to interpret this was that the “medicine” given to Africans in transfusion, blood, was possessed in the same amount and with the

same control by Africans as anywhere else in the world. There were few or no drug companies or expensive chemical manufacturing or rare materials that had to be purchased. As far as donors were concerned, therefore, the history of blood transfusion offers a good example of Africans' ability to organize and adapt their health care well when the materials were available to them.

With some significant exceptions, the most important institutions in finding ways to obtain blood for transfusions were hospitals. Initially, donors were found as needed, from family, friends, and those willing to be on call. Later, donors were provided food and drink and in some places payment, both officially and unofficially. Most important in this process was not whether donors were "voluntary" or paid, since in Africa notions of obligation and compensation were more complicated than in Europe or North America. Rather it was the size and facilities of hospitals or collection centers that dictated whether blood was drawn for immediate use, as with smaller hospitals, or for storage and distribution to other hospitals, as with larger facilities.

The main finding about the history of risk from blood transfusion in Africa is that those giving transfusions were well aware of risk from the start, and that is not surprising given the disease environment. That does not mean there was much that could be done to prevent most disease transmission through transfusion. For example, malaria is not screened to this day in countries where it is endemic (most of sub-Saharan Africa). If potential blood donors with malaria were screened, the wide prevalence of the disease would mean drastically reducing the number of transfusions, and those transfused would face exposure to the disease in any case.

The blood transfusion practices in sub-Saharan Africa were incapable of detecting HIV, as was the case initially with even the most sophisticated screening in more developed health care systems. In contrast, Africans did not have the resources to improve immediately their ability to detect and screen for the virus once it was recognized. As a result, given the wide use of transfusion, it was unfortunately an important reason for the initial spread of AIDS. Yet African health officials were not without means to understand and respond to the new danger, thanks to forty years of experience and a framework of appreciating long-standing health risks. Both by screening high-risk donors and taking advantage of outside support for testing for HIV, as well as technical advice and training, the reduction of AIDS transmission through contaminated blood transfusion was one of the quickest and most successful responses to the epidemic in sub-Saharan Africa.

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