

Mayo Clinic and the Origins of Blood Banking

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In the early 1930s, Dr Charles H. Mayo of Mayo Clinic asked the head of the anesthesiology section, Dr John Silas Lundy, to improve pediatric transfusion practice (Figure 1). Under Lundy's energetic guidance, the Section on Anesthesia of Mayo Clinic soon assumed responsibility for all transfusions at the clinic and began the revolutionary practice of storing refrigerated blood, creating the first blood bank in the United States.

ANESTHESIA, TRANSFUSION MEDICINE, MAYO CLINIC, AND THE 1930S

Dr Lundy arrived at Mayo Clinic in 1924, as head of the Section on Anesthesia. In the coming years, Lundy would be president of the American Society of Anesthesiologists, the American Board of Anesthesiology, and the Anaesthetists' Travel Club, all while publishing an average of an article per month in the peer-reviewed literature.¹ Dr Lundy writes,

In 1933 Dr. C.H. Mayo was unhappy about the complaints about blood transfusions as voiced by the pediatricians. I was selected by the Surgical Society of the Mayo Clinic to assume direction of the transfusions to children. I did so for a year, at the end of which it was decided I should supervise all transfusions. I was in charge of this activity for a good many years, until Dr. Thomas B. Magath, while a member of the Board of Governors of the Mayo Clinic, 1948 to 1956, succeeded in having this service transferred to the section of clinical pathology.²

In the 1930s the now ubiquitous plastic indwelling venous catheters did not exist. Access for transfusion was obtained with a rigid steel needle that was kept in place for the duration of the transfusion. Great skill was required to place the steel needle without puncturing the back wall of the vein, especially in children. Anesthesiologists, who routinely placed this sort of intravenous access in the operating room, had the necessary ability and experience and were already providing the hospitalized patients with intravenous access in "those cases where venipuncture ha[d]

become difficult."³ Additionally, Lundy had described a technique of venous cutdown earlier that year.⁴

Anesthesiologists were familiar with transfusing blood because blood transfusions were usually performed in the perioperative period; this was true for 680 of the 1021 transfusions that were performed in 1934,³ 377 of the 754 in 1935,⁵ and 1398 of the 2058 in 1936.⁶ Thus began the involvement of Lundy and the Section on Anesthesia of Mayo Clinic, which would lead to many advances in this field.

THE ORIGINS OF BLOOD BANKING IN THE UNITED STATES

Lundy applied his seemingly boundless energy to transfusion medicine. With the Section on Anesthesia responsible, "the number of transfusions increased considerably."⁵ At that time, when a transfusion was required, professional and nonprofessional donors were brought on site, and blood was given directly to the patient. As the number of transfusions increased, a need arose for a way to store blood. Lundy made the following observation,

In 1935, we frequently kept citrated blood in the ice box for as long as fourteen days and found that it could be administered satisfactorily with the usual benefits accruing to the patient and without an undue incidence of untoward reaction. In this way we



FIGURE 1. Dr John Silas Lundy, 1934.

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are able to draw from a donor the blood that we might wish to administer subsequently in divided doses and in small quantities. Thus we escape the necessity of calling the donor each time a transfusion of a small amount of blood is undertaken. This practice also permits the keeping of blood from a universal donor on hand in anticipation of an emergency when immediate transfusion is essential.⁵

In Lundy's words, "thus was established the first blood bank in North America, as far as I can find out. The Cook County Hospital in Chicago began such a service the next year, in 1936. This incident can be validated, because I reported the establishment of my blood bank in my annual report for 1935."⁷ The first blood bank in America was set up by Lundy in a cooler located in the laboratory of W. C. MacCarty at Mayo Clinic.⁷⁻⁹

In his "Annual Report for 1936 of the Section on Anesthesia: Including Data on Blood Transfusion," Lundy wrote that "Refrigerated blood was used in 149 cases." In that year, 32% of the transfusions performed by the anesthesia service were in nonsurgical patients. In the next 4 years, the percentage of refrigerated blood used for transfusion continued to increase. Lundy kept statistics on the use of refrigerated blood, focusing on transfusion reactions. In his 1936 annual report, he noted that the incidence and severity of any type of reaction were markedly decreased when refrigerated blood was used.⁶

Lundy saw additional needs for patients requiring transfusions. In 1934, he invented a rapid-infusing hand roller to speed the administration of blood.⁴ A refined model was described 4 years later (Figure 2).¹⁰ Adams and Lundy suggested a hemoglobin transfusion "trigger" of 8 g/dL to 10 g/dL for patients of poor surgical risk.¹¹ In 1938 Lundy continued his research in the field. Working with a chemist at Hormel & Co in Austin, MN, he investigated quick freezing as a means of prolonging the shelf life of banked blood.¹² Lundy kept detailed data and records of all transfusions performed, including indications, blood groups, donors, and reactions.^{3,5,6}

In the 1950s and 1960s, the increasing sophistication of truly laboratory technological aspects of blood banking (eg, red blood cell antibody identification, pathogen testing) moved transfusion medicine into the realm of laboratory pathologists. As laboratory practices came under increasing scrutiny from the Food and Drug Administration and other regulatory bodies, clinical pathologists increasingly assumed responsibility for transfusion medicine in the United States.

Charles Mayo gave John Lundy a difficult task—improving the experience of children undergoing transfusion. Lundy's characteristic drive facilitated many advances in

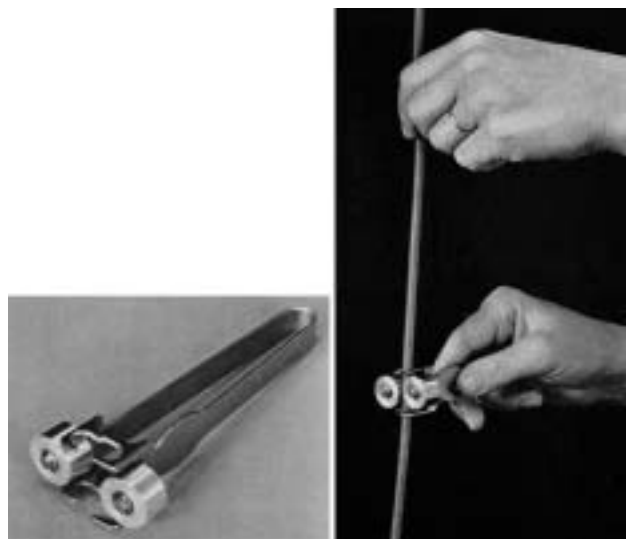


FIGURE 2. Lundy's rapid-infusing hand roller.¹⁰

transfusion medicine. The nation's first blood bank, established by Lundy in a colleague's laboratory refrigerator, preceded the better-known Cook County blood bank by a year. Lundy's work on the rapid infusion and freezing of blood was years ahead of its time.

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