

Nils Alwall and his input into development of Polish haemodialysis



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ABSTRACT

Nils Alwall's fame and reputation as a pioneer and leader of haemodialysis treatment of patients with chronic renal disease was widespread across Europe in the 1940s, 50s and 60s. Little wonder, then, that his renowned clinic in Lund, Sweden was willingly visited by many doctors from Central-Eastern Europe including those from Poland. The first Poles to meet Alwall in his native Sweden right after WW2 were Maria (nurse) and Bożysław (technical worker) Kurowski. The meeting gave rise to the publication of the first nursing paper in Poland in 1958. Nils Alwall's archive in Lund holds rich correspondence exchanged with Polish doctors. The first one to establish contacts with the famous Swede was dr. Zygmunt Hanicki from Krakow, who later received one of Alwall's first dialysis machines enabling him to perform experiments whose results were published in 1949 and 1950. The first longer stay in Lund started in 1957 when dr. Tadeusz Orłowski, the future leader of the Polish nephrology and transplant therapy, made his way to the famous centre. Next, in 1958 the clinic was visited by dr. Zdzisław Wiktor of Wrocław, the future Head of one of the first clinics of nephrology in Europe and the following year dr. Jan Roguski of Poznań also sought to gain experience there. In the meantime, a number of dialysis centres equipped with Alwall-type haemodialysis machines were set up in Poland including the Poznań unit (1958) established by Kazimierz Bączyk, the Warsaw one (1959) by Tadeusz Orłowski and the Krakow centre (1962) by Zygmunt Hanicki. It was in 1960 when dr. Zbigniew Fałda from Warsaw completed his training in Lund. Later, in 1966 the Lund centre hosted dr. Jan Kurkus. Nils Alwall's first visit to Poland was in 1959 during the Congress of the Polish Society of Internal Medicine in Gdańsk. His second visit to Poland happened in 1970 when he gave two lectures. By the time Nils Alwall retired as many as a few dozen Polish doctors had gained experience in Lund later transplanting it to their centres in Poland confirming the significant impact of the Lund centre on the development of the Polish dialysis therapy.

KEYWORDS: Nils Alwall, dialysis unit, Lund University, history of haemodialysis, Poland

Introduction

There can be little doubt that the introduction of haemodialysis into the treatment of patients with chronic renal disease was among the greatest medical achievements of the 20th century. In Europe, the pioneering investigations into the method began in the 1940s and were conducted independently by two outstanding figures – the Dutch Willem Kolff and the Swede Nils Alwall. Apparently, Poland was one of the first countries in post-war Europe which could have tapped into the advantages of the new method when one of the clinics of the Krakow Medical University received an early haemodialysis machine designed by Kolff, had it not been for the fact that most probably it was never used to treat patients. Alas, with Kolff's interest being shifted to developing other artificial organs his cooperation with Polish doctors stopped. The other pioneer of the European dialysis treatment was Nils Alwall of Lund University in southern Sweden. It was him who in the 1940s, 1950s and 1960s had by far the largest experience in applying haemodialysis to treat patients with renal insufficiency using a self-designed machine. The first devices to be used in Poland, starting from 1958, came from Sweden and Alwall's centre in Lund was the place where Polish doctors became acquainted with and gained experience in using this particular method of treatment (1- 3).

The history of Alwall's contacts with Poles began right after the war when the Poznań-educated lawyer Bożysław Kurowski and his nurse wife Maria, both prisoners of German concentration camps, settled down in Sweden. The Polish couple worked at Alwall's clinic since the early days of the newly-established dialysis centre. B. Kurowski's job was as a technical assistant at the centre while his wife worked as a scientific assistant at the

science and research laboratory. As such, both gained profound knowledge of the issues related to dialysis treatment. B. Kurowski was a co-author of a compendium titled *Dialysis – the Tasks of Technical Assistants* giving a detailed description of a machine preparation and testing as well as all the other activities necessary to run a dialysis session. As it was, Kurowski was Alwall's right-hand man when it came to operating artificial kidneys. His wife, Maria, was the author of *Artificial Kidney Saves Lives*, a paper published in *Pielęgniarka Polska* in 1959 as one of the first publications on the subject in Poland. Owing to their linguistic skills, the Kurowskis were frequently asked by Alwall to introduce overseas visitors into technical intricacies of dialysis and their home would always be full of foreign guests including those from Poland who were having a training at Alwall's clinic (4) (Figure 1).

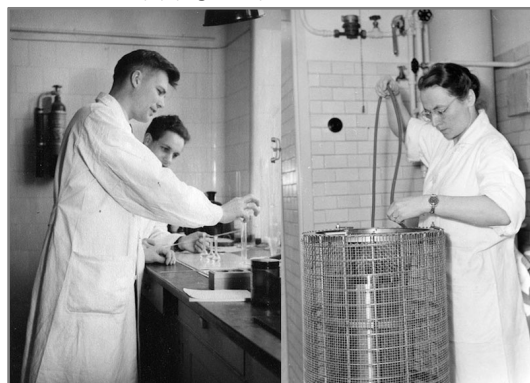


Figure 1 - Maria and Bożysław Kurowski at work (Nils Alwall's archive, University Library in Lund, Sweden)

The first letter from Poland to Alwall was sent on 12th March 1948 by dr. Zygmunt Hanicki from the 2nd Department of Internal Medicine at the Jagiellonian University in Krakow headed by professor Tadeusz Tempka. In his correspondence Hanicki enquired about technical details and the price of a dialysis machine. At the time, the new invention cost approx. 500-600 Swedish crowns, yet its production was a significantly long process. In order to go around this setback, Alwall's idea was to lend an older-type machine, which had been used for performing dialysis in dogs, with which Hanicki could start experimenting. The size of the machine made it impossible to use it for human treatment. The organizational activities were troublesome and involved the Polish consulate in Stockholm, yet, finally, the machine arrived in Krakow in November 1948. The rich follow-up correspondence between Hanicki and Alwall, first in English and then in German, referred to the problems of starting the machine, dialysis clinical details or availability of heparin. The analysis of the letters exchanged by the two reveals that heparin was delivered to Krakow in December 1948, however, it remains unknown whether it was used for further experimental work with Alwall's machine or not. In his early experiments, following in the footsteps of the famous Swede, Hanicki used sodium citrate as an anticoagulant. The letters unveil that Hanicki's visit to Lund was also considered and discussed, however, it never happened. Instead, on 27th June 1949 he sent to Lund his first Polish publication on the work and application of the artificial kidney. In his subsequent publication, out in 1950, Hanicki presents the results of experimental dialyses with the use of aqueous urea solution and uremic patients' blood. In July 1951 another piece of information about a planned visit to Lund appeared when Alwall issued a formal invitation for Hanicki to spend 6 weeks in his centre. Again, the visit never happened. In 1956, Hanicki informed Alwall about the fact that the Health Ministry had purchased three artificial kidneys from Avesta company which were to be delivered to the cities of Poznań, Warsaw and Krakow. It was the first information concerning the planned purchase of an artificial kidney for Krakow. We know that Andrzej Biernacki and Jan Roguski made significant efforts to ensure delivery of dialysis machines for Poznan and Warsaw respectively, which happened in 1958. Two years earlier, in February 1956, Hanicki made his way to Prague, Czechoslovakia to be trained with a machine that had already been installed there. In his last letter dated 29th January 1964 Hanicki reported that at the time there were as many as 5 artificial kidney centres, 3 of which used Avesta machines. Moreover, he informed that the Krakow centre had already been operating for one year and a half. Historical records show that it was opened in 1962 when the Warsaw and Poznań ones had already been in use. Later, Zygmunt Hanicki became Head of Clinic of Nephrology in Krakow. The correspondence between Alwall and Hanicki is among the most voluminous in the archive containing no fewer than 30 letters (5 – 8) (Figure 2).

Professor Stefan Wesołowski, a Warsaw-based urologist, met Alwall during a medical congress in Athens in April 1955. Two months later he sent a letter to Sweden asking Alwall if Wesołowski's assistant, Tadeusz Krzeski, could pay a visit in Lund in order to learn about the artificial kidney. The answer was obviously positive and between 20th and 30th November 1956 Krzeski had a chance to get hands-on experience with the artificial kidney in Lund. It was the first documented visit of a Polish doctor at Alwall's clinic. We know that later Krzeski remained faithful to his department of urology, Wesołowski, however, took part in Poland's first peritoneal dialysis session performed in 1953 by Orłowski and Nielubowicz.

Tadeusz Orłowski, a Warsaw Medical University professor-to-



Figure 2 - The title page of Zygmunt Hanicki's work prepared on the basis of experimental research with the use of Alwall's dialysis machine.

be, met Nils Alwall in Geneva in October 1956, and then, in July 1957, sent a letter to Lund asking about a possibility to have a 2-month training there. The request was supported by a letter of recommendation provided by Andrzej Biernacki, the Head of the 1st Clinic of Internal Medicine in Warsaw. The visit, which was the first longer-time training of a Polish doctor in Lund, took place between 28th October and late December 1957. On his return to Poland, Orłowski shared the new knowledge and experience with his Polish colleagues at the clinic. Besides invaluable knowledge he also brought back new designs of catheters and of other necessary equipment, the value of which could not have been exaggerated for the clinic getting ready to obtain the first artificial kidney purchased by the Ministry of Health in mid-1958. The machine was first put to use to perform the first test dialysis in a dog on 31st December 1958. The first dialysis in a human patient happened only 2 days later, on 2nd January 1959 when a child was treated with the new method. A detailed account of the preparation process and the use of Alwall's artificial kidney can be found in Zbigniew Fałda's article. In subsequent years, Tadeusz Orłowski left the dialysis department to his assistants himself taking up the organization of the renal transplant programme (9- 11) (Figure 3).



Figure 3 - Dr. Zbigniew Fałda demonstrating a new Alwall's artificial kidney at the Warsaw centre (courtesy of Zbigniew Fałda).

In his letter to Alwall dated 8th July 1958, professor Zdzisław Wiktor from the Wrocław Clinic of Nephrology asked the famous Swede about a possibility to have a training in Lund, which started on 10th December and lasted 2 weeks. The Clinic's Guest Book contains an entry in German from 29th December 1958. In the next letter, Wiktor invited Alwall to come to Wrocław following the 20th Congress of Internal Medicine to be held in Gdańsk on 10-12 September 1959 which Alwall was going to attend. Alas, Alwall having to return to Lund, the visit never happened. Zdzisław Wiktor was the Head of Poland's first and Europe's one of the first clinics of nephrology established in 1958. The first haemodialysis in his centre was performed in 1964 (12, 13).

Jan Roguski from the 2nd Clinic of Internal Medicine at the Medical University of Poznań met Alwall during the Congress of Urology in Genoa in October 1956. In his letter dated 15th June 1957 he informed Alwall that the Ministry of Health had decided to purchase an artificial kidney from Sweden for the Poznań centre and asked the Swede to try and hasten the production and delivery of the machine. Alwall did intervene and promised that it would be made available within a few months, at the same time inviting one of the Poznań clinic's doctors to Lund with an aim to provide training about the operation of the artificial kidney. Although dr. Kazimierz Bączyk was the one selected to visit Lund the lack of funds from the Ministry of Health made the trip impossible. Fortunately, Bączyk, who had already participated in a short training in Bern, Switzerland, possessed some knowledge and experience in using Alwall's device. The artificial kidney, along with a batch of cellophane membrane, arrived in Poznań in mid-1958 and was first used in autumn that same year. The first haemodialysis session in Poland was performed in November 1958 by a team headed by Kazimierz Bączyk. Later, due to delayed deliveries from the USA, Roguski asks Alwall for help in obtaining cellophane membrane, a request which is eagerly granted. In January 1959 Roguski writes a letter in which he asks for an invitation to Lund for April in order to learn about the system of work at the clinic. However, the arrangement of the precise term of the visit will prove problematic due to Roguski's planned trip to Philadelphia, USA in connection with Rockefeller Foundation Scholarship. Eventually, when he makes it to Lund on 2nd April 1959, Alwall is away giving lectures in Germany, Switzerland and Greece, so the two do not have a chance to meet. The first occasion to talk comes a few months later during the 20th Congress of Polish Internists held in Gdańsk on 10-12 September 1959 to which Alwall was officially invited by Roguski (14- 16).

One of the subjects discussed during the Congress was the treatment of advanced uraemia with the use of the artificial kidney, the method which had been used in Poland for the past 2 years. Alwall took an active part in the symposium talking especially about indications for dialysis and treatment results. With a whopping number of over 1000 sessions performed since 1946, the Lund clinic had enormous experience in the matter. Within the two preceding years (1957-1958) as many as 200 sessions were performed annually, which made it the leading haemodialysis centre in the world. The results of his observations were published by Alwall in the *Polish Internal Medicine Archive* in 1960 (17, 18).

In October 1959 Alwall received a letter from professor Antoni Horst which contained an invitation for Roguski's 60th birthday and his 35th anniversary of scientific activity. The celebration was to be held in autumn 1960 and Alwall was requested to give a speech of his choice that would later be published in *Polish Medical Journal*. Finally, in 1960, the famous Swede

prepared and published in *Polish Doctors' Weekly* his paper titled *On the Size of Kidneys in Acute Renal Failure* (19) (Figure 4).

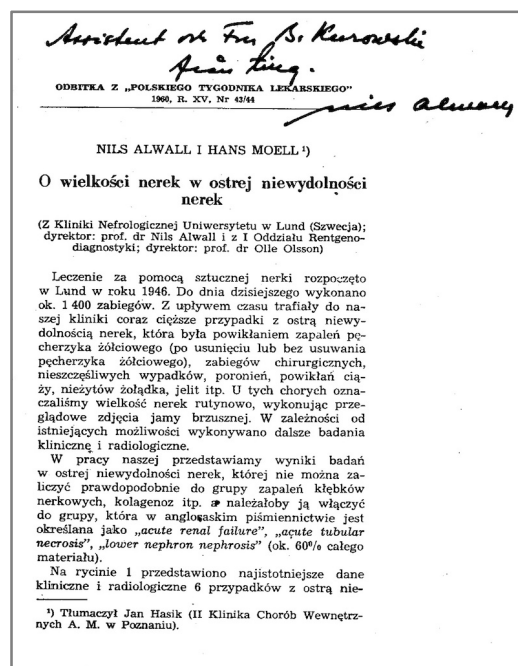


Figure 4 - The title page of Alwall's publication in Polish Medical Journal.

It was during the Congress of Internal Medicine in Gdańsk in September 1959 and, then, during his visit to the 1st Clinic of Internal Medicine in Warsaw that Alwall met Andrzej Biernacki and the clinic assistant Zbigniew Fałda who showed him around the Artificial Kidney Department. In his letter dated 10 February 1960 Fałda asked about a possibility to work at the Lund Dialysis Department for one month some time between May and August 1960. These being holiday months in Sweden when the clinic is usually short of staff and Alwall knowing about the Warsaw unit's experience where 60 dialysis sessions had already been performed in patients combined with Fałda's publications on technical problems with extracorporeal dialysis and his involvement in the creation of the film titled *The Treatment of Acute Renal Failure with Alwall's Artificial Kidney*, permission was granted. Consequently, Fałda arrived in Lund on 31st May 1960 with disposable PVC venous catheters produced in cooperation with engineer Juliusz Deczkowski used in Warsaw since the late 1959. The catheters were put to test during dialysis sessions in Lund. Although Alwall himself was not present during the catheter implementation, later his comment was: "it works" and "it's a good idea". At that time glass cannulas and glass silicone-covered air-vents were used, little wonder, then, that Alwall was interested in replacing them with Fałda's plastic catheters. On his return to Warsaw, Fałda sent to Lund about 100 catheters for further tests. Back in Sweden a young girl treated for 6 months with an initial diagnosis of acute renal failure caught Fałda's attention. Anuria was still present, yet the general condition of the patient was good despite the unsolved problem with vascular access, which suggested remarkable skills of the dialysis team. Most probably, the acute renal failure had turned into the chronic one. Belding Scribner from Seattle, USA, started treating chronic renal failure a few months later (March 1960) using a new type of vascular access known as the Scribner's shunt. However, amounting to 100 USD the cost of this facility was significant, which made it hardly affordable in Poland. Having returned from Lund Fałda had a similar idea and, in July 1960, he started working with

Deczkowski with the aim to develop a Polish arteriovenous shunt based on widely-available polyethylene. Their shunt, which was later subject to gradual improvement, was successfully used at the Warsaw clinic to facilitate the process of treatment of acute renal failure. It was in August 1963 when Fałda gave a few arteriovenous shunts of his design to Alwall. Although he had already used Quinton shunts for the treatment of 15 patients he reportedly intended to use Fałda's development at his clinic. That said, no clinical opinion was ever offered or published. Dr. Fałda's impressions from his 1960 stay at the Lund clinic can be found in his two papers published in 1960 and 2010. The 1960s was a decade when more Polish doctors established contacts with Alwall and visited Lund and more papers on his artificial kidney were published (20- 23) (Figure 5, Figure 6).



Figure 5 - Professor Nils Alwall (second left) during his visit to Warsaw in 1959 (Nils Alwall's archive, University Library in Lund).



Figure 6 - Fałda's publication following his training in Lund (In homeland of the artificial kidney).

Dr. Jerzy Wroński from the Miners Hospital in Bytom, Poland visited Nils Alwall in January 1962 after the hospital had put forward plans to open a dialysis unit. Wroński went to Sweden in order to learn about the technical details concerning the installation and operation of a dialysis machine, water quality as well as the general arrangement of dialysis facilities. Alwall's response to these doubts was that a laboratory room should be arranged in a way that would enable transforming it into a

dialysis room in the future, the size of which in turn should make it possible to fit in a ventilator. As regards water quality, it must be softened by means of special filters. The Bytom dialysis centre was opened in 1964, following efforts made by its organiser – Zbysław Twardowski, the future world-class nephrologist, author of numerous treatment-facilitating solutions for both HD and PD.

Jan Kurkus, the former assistant at the 1st Clinic of Internal Medicine in Warsaw, visited Alwall's centre in September 1966 with a letter of recommendation from Tadeusz Orłowski, the Head of the Warsaw clinic, in his hand. The Swedish staff were more than kind and helpful towards the young Pole. During a two-hour conversation at Alwall's office Kurkus had a chance to learn about the intricacies of the artificial kidney and was shown posters presenting growing trends of the numbers of patients in need of dialysis treatment in the years to come. The analysis of death certificates indicated that as many as 70 new patients per one million would appear each year, the level which was achieved in Sweden in the mid-1990s. It was during his stay in Lund that Jan Kurkus visited the Kurowskis for the first time, the acquaintance which was to change into a deep friendship with frequent almost family-like meetings. Kurkus' second visit to Lund happened in 1969 following the ISN Congress in Stockholm when, accompanied by other workers from the 1st Clinic of Internal Medicine from Warsaw, he visited the newly-built Department of Nephrology and the Dialysis Centre with which, almost 26 years later, he was to be professionally tied.

The 1969 ISN Congress in Stockholm was preceded by Fałda's request to Alwall concerning the participation of a group of doctors from Warsaw in the event and their intention to visit the Lund clinic afterwards. The visit of the group (Zbigniew Fałda, Hanna Fałda, Liliana Gradowska, Włodzimierz Kardasiewicz, Jan Kurkus, Mieczysław Lao, Wojciech Rowiński, Danuta Rowińska, Jadwiga Wojtulewicz-Kurkus) took place on 19th June 1969. Indeed the two decades between 1950 and 1970 saw dozens of Polish doctors visit Alwall and his clinic each year.

In June 1970 Tadeusz Orłowski invited Nils Alwall to Warsaw to give a series of lectures. The plane from Brussels with Alwall on board landed at Warsaw airport in 25th October 1970. During his stay the famous researcher gave two lectures: *A Long-Term (19 years) Clinical Observation of 32 Living Patients with Acute Glomerulonephritis with Oliguria Subjected to Dialysis Treatment in 1947-1969 and Dialysis Treatment and its Problems in Sweden*. All through his stay (25-28 October) Alwall was ushered in Warsaw by Zbigniew Fałda. Today, we have a pleasure to see the agenda of Alwall's visit in the Polish capital which included dinner at the Jabłonna palace and an evening at the opera.

Zbigniew Fałda's future professional path has led him from the Warsaw dialysis centre, which he headed, through a clinic in Seattle, USA, where he did a one-year-long apprenticeship, to the position of the Head of the Department of Nephrology and the Dialysis Centre in Bad Wildungen, Germany.

Although Nils Alwall retired in June 1971 at the age of 67 for a few following years he still held his "pensioner's room" at the clinic. His successor as the Head of the centre was Tore Lindholm, who managed it until he retired in 1989, at which time, a Pole Jan Kurkus took over and continued until 2006.

The Polish-Swedish cooperation, which started in the 1940s, flourished throughout the next decades. It has brought the Polish dialysis treatment numerous benefits and was crowned in 1989 when J. Kurkus took Alwall's position paying back the Polish debt to Nils Alwall and his clinic (24).

The general interest in the Clinic, especially in the development of dialysis treatment in Lund, when it was headed by Alwall's successors was still significant, though the number of visitors

was gradually decreasing. This state of affairs was largely down to the remarkable development of dialysis treatment, the appearance of new centres of nephrology and easy access to dialysis-related equipment. The Lund clinic has always been open to accept doctors and other medical personnel from Poland, both during and after Alwall's management. Its guest book contains entries from most of the visitors including individuals who later played the main roles in the development of dialysis treatment, notably haemodialysis, in Poland, headed university clinics, departments of nephrology and regional dialysis units, toxicology and transplant centres. The list of renowned names includes: Witold Zegarski, Wojciech Witkiewicz, Teresa Wyszynska, Kazimierz Trznadel, Zofia Wańkowicz, Andrzej Manitus, Stanisław Czekalski, Rafał Wnuk, Antoni Sydor, Olgierd Smoleński, Adam Jelonek, Ryszard Gellert, Bolesław Rutkowski, Andrzej Książek, Janusz Puka, Joanna Matuszkiewicz-Rowińska, Anna Skrzycka, Zbigniewa Śledziński, Wojciech Pruszczyński, Leszek Sadowski, Mirosław Krocak, Marlena Ruszkiewicz, Marek Stopiński, Janusz Sadowski, Krystyna Szprynger. A very special kind of cooperation was established between the Lund centre and the Department of Nephrology and Dialysis Treatment at the Voivodship Hospital

in Wrocław, Poland headed by Janusz Ostrowski. The cooperation was based on mutual week-long visits at the respective departments by doctors, nurses and technical personnel once a year in 1999-2006, the benefits of which on both sides were evident, and the list of those willing to participate in the exchange was never short.

Conclusion

It was the primary intention of the author to highlight the considerable influence of the Swedish professor Nils Alwall and his dialysis centre on the development of Polish dialysis treatment. The great number of Polish doctors who have visited the world's leading haemodialysis centre in Sweden in pursue of knowledge, experience and self-development must have had a positive impact on the development of the field in their home country bringing it to the present state of being on par with the best in the world.

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