



History of Medical Laboratory Diagnostics in Poland

Katarzyna Klimasz¹ and Przemysław Tomasi^{1*}

¹College of Medicine, Jagiellonian University, Wielicka 265, 30-663 Cracow, Poland.

Authors' contributions

This work was carried out in collaboration between authors. Authors read and approved the final manuscript.

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ABSTRACT

Background: Medical laboratory diagnostics in Poland has a long history, however there is lack of studies in this field.

Main Findings: The first clinical laboratories on ethnic Polish territory were founded in the mid. 19th Century. After the World War I, rapid development of laboratories in Poland, similar to pan-European trends, occurred.

During the World War II many laboratory professionals were killed and laboratory infrastructures were destroyed or severely damaged. In the post-WW II period, during the communist era, the development of laboratory diagnostics in Poland was not significant due to the lack of access to the latest western technologies. However, some unique solutions to some problems were developed. For example, special M.Sc. studies for laboratory staff were introduced. Towards the end of the 20th Century, in the post-communist era, significant development of private laboratories was observed with subsequent integration into several companies. In Poland, laboratory diagnostician is a profession of public trust and over 14,000 professionals are registered in The Polish Chamber of Laboratory Diagnosticians.

Conclusions: The history of medical laboratories in Poland reflects the development of this key element of healthcare. The recent history has several unique and valuable solutions as teaching laboratory staff in specific medical colleges and organizing them in associations of professionals.

Keywords: Clinical chemistry in Poland; medical laboratory diagnostics in Poland.

*Corresponding author: Email: p.tomasik@uj.edu.pl;

1. THE BEGINNING OF LABORATORY DIAGNOSTICS IN POLAND

The history of laboratory diagnostics, defined in the West as pathology, clinical chemistry, biological chemistry or laboratory medicine, is almost as long as that of medicine [1]. It became an independent discipline at the turn of the twentieth century, [2] thanks to a remarkable progress in chemistry, biology and physics, which enabled the rapid development of laboratory tests [3]. The first chemical analysis laboratories on ethnic Polish territory were already in place in the nineteenth century [1,2]. Thus, analyses were performed locally by Polish staff. Initially, the diagnostic laboratories qualitatively and quantitatively analysed urine, urinary stones, various secretions and pathological body fluids [4]. Probably the first clinical laboratory in Poland was set up in 1851 in Cracow hospital by Joseph Dietl [5]. In addition, the first medical laboratory in a children's hospital in Cracow was established by Dr. T. Giza and the chemist, K. Gajewski, in St Ludwik Hospital. For years Gajewski was the head of that laboratory [6]. Dr. Dietl's idea was followed up by Dr Władysław Biegański, who established laboratories for microscopic and chemical tests [7]. An increasing number of such laboratories facilitated access to in vitro diagnostics, particularly for country physicians for whom the service of foreign laboratories was too expensive and frequently useless due to the instability of samples [8,9].

2. BETWEEN WORLD WARS

The conditions were conducive to the setting up of laboratories of medical analysis as an essential part of public health after the restitution of Poland following First World War. On 19 July 1919 a Fundamental Sanitary Act was passed in Poland. It authorized the Office of Public Health to supervise overall health issues in the country and take responsibility for the management of medical affairs. The task involved, among other things, actions to control acute and chronic diseases (disinfection, disinfestation, folk baths, the production of serums and vaccines, bacteriological laboratories, cemeteries, funeral homes and the transport of mortal remains) [10]. However, the Office of Public Health was abolished in November 1923 and all hygiene and health issues were shared between 10 ministries [11]. The right to issue licences for the running of medical laboratories was given to the General Management of Health Service within the Ministry of the Interior (Home Office) [12]. From November 1918 the Central Epidemiological Institute, the government and research institution for controlling the spread of epidemics and their prevention was created in the initial stage of the formation of the Polish Health Service. Its activity followed from the Fundamental Sanitary Act. In October 1921 the Central Epidemiological Institute was turned into National Institute of Epidemiology, then two years later into the National Institute of Hygiene (Państwowy Zakład Higieny; PZH) with its headquarters in Warsaw and 13 local divisions—these were in place up to 1939. Research performed in the PZH covered microbiological, serological, chemical and epidemiological problems as well as activity supporting pharmacodiagnosics in controlling healthcare [13,14].

Interpretation of the Act on the practice of medical physicians issued on 2 December 1921 made employment in laboratories unattractive for MDs. The regulations of the Ministry of the Interior (General Headquarters of the Health Department) considered medical practice as the direct contact of physician with patient. Therefore, physicians involved either in research or administration faced difficulties in getting licenses from the professional corporation [15]. However, experts from other areas could be accepted for service in medical laboratories after approval from the Health Department [12]. In the 1930s the analysis of blood, urine and faecal matter could be performed in the analytical laboratories of pharmacies [16]. A number

of patients took the opportunity for self-checking for diabetes and diagnosing tuberculosis and nephrolithiasis [17]. Physicians opposed the carrying out of diagnostic analysis in pharmacies. In their opinion, the same person should not collect the biological material for analysis and dispense medicines, because such a person could become a potential source of infection, leading to epidemics [18].

In the period between the World Wars several pharmacies employing technicians were owned by Jews, [19] chiefly in the main Polish cities like Warsaw, Łódź, Cracow, Vilnius and Lwow [20]. Before World War II the proportion of pharmacists and technicians who were Jews was 24.1% [21]. Because of the increasing need for medical analyses, Jews organized and owned private analytical laboratories [22].

3. THE COMMUNIST ERA

After Second World War, there was an urgent need for medical laboratories and technicians because of the epidemiological risk resulting from a drastic decrease in the standard of living, environmental pollution (human and animal bodies) and the migration of huge populations caused by shifts of the borders [14,23]. The Main Office of Pharmacy and its regional divisions restored the chemical-analytical laboratories ruined by the war and established several new ones [24]. Their equipment was purchased from member fees [25]. Up until the time of their closing in 1951, [26] the Main Office of Pharmacy offered in its laboratory the analysis of blood, saliva, pharyngeal swabs, faecal occult blood tests and tests for the acidity of urine and genital discharge for sexually transmitted diseases, as well as other microbiological and parasitic tests [27,28]. The development of laboratory diagnostics in the second half of the twentieth century needed continuous improvement of the instrumental base. Unfortunately, laboratories organized in pharmacies could not offer such a wide spectrum of analyses. Therefore, following Instruction No. 14 of the Ministry of Social Health and Welfare issued on 30 July 1968, diagnostic labs in pharmacies were closed [9]. In the 1970s, the Polish health service was modified and diagnostic labs were implemented in the public health care system [29]. Medical laboratories were located in hospitals or at outpatient clinics. Private laboratories in communist Poland were scarce.

In the middle of the twentieth century analyses in hospital laboratories were performed by technicians and, if urgent, at night-time; the physicians themselves analyzed blood or urine [30]. Only physicians were entitled to perform blood and bone marrow smears [31]. Because of the shortage of the qualified staff educated to the university level (among them physicians), clinical chemistry courses for students of the medical and biology faculties were introduced in 1948 at the Department of Physiological Chemistry at Lublin Medical University. In 1954, departments of analytics were formed within the Institute of Training and Specialization of Physicians in Warsaw and Bydgoszcz. They were designed for post-graduate education within this specialization. For the physicians, work in laboratories was less attractive and profitable. Therefore, medical laboratories were frequently headed by a chemist, biologist or microbiologist [32]. Analyses were performed by staff trained to the high school level. Due to an increasing need for laboratory technicians, undergraduates were accepted for training [33,34]. Since 1956, based on the Health Office Instruction No. 67/55, dated 21 November 1955, concerning the profession of medical technician, applicants had to graduate either after two years at the post-graduate school for medical technicians or pass the national examination in front of a specially called committee [35]. In Poland there were seven post-graduate schools for technicians [30]. Since 1960 the teaching of laboratory diagnostics (known as clinical chemistry, clinical biochemistry or laboratory medicine) has been a compulsory a part of medical studies [36]. During that time the medical specialization

that is termed “laboratory diagnostics”, which is now still a medical discipline, was introduced [37]. However, the number of physicians who were laboratory diagnosticians did not increase.

Up to the 1970s, laboratories were headed by staff with MScs in biology, microbiology, biochemistry and pharmacy, and sometimes by physicians [38]. In 1970 the Pharmaceutical Faculty of the Warsaw Medical University was the first in Poland to introduce studies of clinical laboratory diagnostics [9]. Subsequently, in 1977 this field of study and a degree course was introduced at the Medical Universities in Cracow [39] and Białystok [40], and in the following years at the majority of Polish Medical Universities [41]. The programme for the MSc course included, amongst others topics, clinical chemistry, blood count, toxicological chemistry, microbiology, clinical cytomorphology and blood typing as well as functional tests. As a consequence, laboratory diagnostics changed from a medical specialization into medical discipline, and an autonomous profession [9].

In 1980s and 1990s there were over 2,000 medical laboratories in Poland (2,240 in 1981 and 2,154 in 1988) [42]. Large hospital laboratories performed several thousand tests annually, whereas small laboratories hardly performed a thousand. In summary, the instrumentation consisted of 7,000 photocolorimeters, among them 6,000 Spekol colorimeters, and 800–1000 instruments for the determination of the blood acid-base balance [29]. In that period the availability of basic laboratory tests was improved. For instance, in the 1980s just 27.1% of laboratories could determine the level of sodium and potassium, and they were hospital service laboratories only. By 1996, 80% laboratories could measure the levels of these ions. In the 1980s the estimation of total calcium was more common and was available in small laboratories of the outpatient health service. In the 1990s the estimation of total protein could be performed in nearly 80% of diagnostic laboratories, although only every fourth laboratory could also measure albumin concentration, mainly using electrophoretic separation instead of the direct colorimetric method. In the 1980s, only 4% of laboratories performed measurements of esterified cholesterol and almost all employed the one-step Liebermann–Burchard method for that purpose. In the 1990s, 95% of laboratories detected this parameter using the enzymatic method with cholesterol oxidase. In the 1980s the estimation of amylase activity, AST and ALT was offered by over 50% of the inpatient and outpatient health services; in the 1990s almost all medical laboratories offered these tests [42].

4. MODERN TIMES

In the post-communist era (after 1989) Polish medical laboratories reached world standards. All new measurement techniques for enzymatic and kinetic determination of analytes, radioisotopic methods, various immunological methods, fluoro- and chemi-luminescence and methods of molecular biology were gradually implemented [29].

At the present time, dispersal of the market can be observed. In 2006 and 2012 the National Register of Medical Laboratories noted that there were 2,412 and over 2,500 certified laboratories, respectively. Every fifth laboratory has between only 1 and 3 employees. Larger laboratories have from 4 to 10 members of staff and the largest laboratories, which constitute 60–67% of the total number, have between 11 and 24 employees. Very large laboratories and laboratory companies (10–15% total) perform annually over one million analyses [43]. Over half of medical laboratories are private. The beginning of the twenty-first century brought essential modifications to the operation of the system for the medical laboratories and, in consequence, the need for highly specialized personnel. Automation and

computerization changed the profile of employment in the laboratories [44]. There has been a steady decrease in the number of technicians and the Medical Technical High Schools, which offered courses leading to the graduation of medical laboratory technicians after two years of education, have been closed [45]. Currently, in Poland there are 14,000 professionals (MSc), some of whom are specialists (similar to MDs), in 13 branches of medical laboratory diagnostics. In spite of being relatively new, medical laboratory diagnosticians belong to one of four medical professions held in public trust, together with doctors, nurses and pharmacists [46].

5. CONCLUSION

The laboratory diagnostics in Poland has a long history. All the times, even in communistic era, it follows the world standards. Systematic significant increase of number of offered and ordered laboratory tests are observed as diagnosis procedures are increasingly calling on laboratory medicine analysis. In a dozen or so years the Polish market will be divided into two parts—private laboratories represented by a few (two or three) companies and public laboratories localized in the main and/or university hospitals. Graduate studies in Polish universities as well as postgraduate studies for laboratory professionals could be a model for other countries.

CONSENT

Not applicable.

ETHICAL APPROVAL

Not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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