

History of the Infectology Service

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Abstract

Historical evolution of Infectious Diseases Service since the inauguration of the General Hospital of México, the development of Infectious Diseases and the Infectious Diseases Service of this Hospital; The main facts in 118 years are highlighted, the figures of doctors who have stood out, the infectious pathologies and how the care of the infectious –contagious patient has been faced, especially in epidemic outbreaks and pandemics in México.

Keywords: Hospital General de México. Infectious diseases. Infectious diseases service. History of infectious diseases. Mexico.

First period

In 1905, Hospital General de México, Mexico City, Mexico began its activities with 32 wards for the management of various medical conditions (Table 1). The areas dedicated to infected patients and their caregivers are presented in table 2. The wards were physically large horizontal galleries aligned one after the other, with clean water extracted from artesian wells, and built from stainless steel, or porcelain sinks^{1,2}.

In the early years, there was a significant flow of patients, and research activities were initiated. Among these, the research conducted back in 1907 on avitaminosis and chronic intestinal self-intoxication by Dr. Ernesto Ulrich, a pathologist who worked at this center from 1907 through 1934. He was also a professor of Histology, became the director of the Medical School in 1934, and was a member of the National Academy of Medicine since 1906. In 1910, Dr. Eduardo Liceaga's work with Salvarsan for the management of syphilis drew everyone's attention. Dr. Eduardo Liceaga, born in 1839 in Guanajuato, Mexico died in January 1920, had distinguished himself as a medical student

by consistently ranking first in all the courses he attended to. In addition to his medical pursuits, he also had an interest in music and served as the secretary of the Philharmonic Society, taught physics and natural history, acoustics, and phonography in music. In the field of medicine, he played a significant role delving into the medical field of Infectology and working on various diseases such as tuberculosis, syphilis, leprosy, smallpox, laryngotracheitis, yellow fever, and rabies. He brought the rabies vaccine to Mexico in 1888 and used it in a 12-year-old boy bitten by a dog. This vaccine was originally developed by Pasteur in 1885, who gave it personally to Dr. Liceaga. Dr. Liceaga was also involved in the 1886 typhus epidemic and the bubonic plague outbreak reported in Mazatlán, Mexico. He established systems for isolating contagious patients, directed the Pediatrics department at Hospital San Andrés, served as the head of the Typhus Campaign, was President of the National Academy of Medicine, also President of the Superior Council of Health, and Director of the National School of Medicine. He proposed and published the Personal Hygiene Manual. Along

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Table 1. Type of patients and no. of wards out of the starting 32

Type of patients	No. of wards
Non-infectious patients	21
Maternity	2
Puerperal fever	1
Infectious-contagious	5
Gynecology	1
Retirees	1
Observation	1

with engineer Roberto Gayol Soto, he became the Medical Director in charge of the construction of Hospital General in June 1896, with the financial resources provided by the Lottery for Public Charity^{2,3}.

Howard Taylor Ricketts dies at the American Hospital of Mexico on May 3, 1910. He had contracted typhus from the patients' blood and developed the disease that led to his death. General Porfirio Díaz declared 3 days of mourning, and honors and recognitions were bestowed on him. Dr. Ricketts was born in 1871 in Finlay, OH, United States. He codiscovered the bacteria responsible for the Rocky Mountain spotted fever and Mexican typhus (1909) with Wilder. He demonstrated the transmission of these diseases through tick, louse, and flea bites. Back in Mexico, he conducted a research at Hospital General. Later, in Mexico too, Hermann Mooser established the difference between exanthematic typhus and murine typhus due to *Rickettsia typhi* (mooseri). The definitive work on *Rickettsia prowasecki* as the causative agent of exanthematic typhus was published back in 1928 in *Gaceta Médica de México* by Herman Mooser^{2,4}.

During the Mexican Revolution, the hospital did not stop its activities but experienced significant instability, common changes of directors, and the come-and-go of medical personnel. In those years, an epidemic of typhus broke out that flooded the hospital with patients. Up to 600 people with the disease were treated at one time or another. This situation led to dedicating five wards exclusively for these cases. In 1919, the Central Commission for the Study of Typhus was established at Hospital General de México, with Dr. José Terrés serving as its president.

In 1918, the Spanish Flu broke out, and many became ill, many of whom were treated at the hospital with a very high mortality rate (25%). The treatments

used at the time for these patients included quinine, creosote, guaiacol, eucalyptol, phenol, iodoform, sodium benzoate, ipecacuanha, and colloidal gold. During these years, and due to the need to treat so many patients, the Infectology Unit actively participated in the management and research associated with typhus, brucellosis, and influenza. After the armed conflict, the hospital evolved and stabilized.

Infectology ward

Several wards were dedicated to the management of infectious patients. Ward #27 was dedicated to the management of multiple infectious diseases and later evolved into Infectology to eventually merge with ward #27 Bis, becoming ward #28 (Infectology). The individuals responsible for ward #28 (from 1914 through 1937) are listed in Table 3. Dr. Arturo Iturriaga is mentioned in some references as the head of the Infectology Unit at the opening of the Hospital General. However, we should mention that he was the head of ward #28, which was dedicated to the management of puerperal fever, according to the records from the hospital. Dr. José Martínez, Dr. Arturo Iturriaga, and Dr. Manuel Cañas worked in ward #27 only.

We should mention that during this period, various centers in the country were dedicated to the management of infectious patients. These included ward #28 from Hospital General, ward #10 from the Spanish Hospital, an Isolation Unit at the French Hospital, a ward for the management of polio patients at the English Hospital, and the clinical unit of the Institute of Tropical Diseases.

Dr. Cayetano Andrade López, born in 1890 in Morelón, Guanajuato, graduated in 1914 at Michoacana Medical School. He was a professor, writer, poet, and journalist who contributed to magazines such as *Policromía*, *Semanario Político*, *El Girondino*, *El Renovador*, and *El Combate*, some of which he also directed. He was involved with organizations such as Ateneo de Ciencias y Artes, Ateneo Nezahualcóyotl, and Vanguardia Nicolaíta. During the Mexican Revolution, he participated in the conflict, but in 1918, he joined Hospital General where he pursued a career as a medical intern, medical extern, and service manager. He also worked at the La Castañeda Psychiatric Hospital, served as a deputy for Guanajuato in 1924, and held positions as the Director of Information for the Ministry of the Interior and directed the Official Gazette. He is the author of "Lumbre Falsa," "Anecdotario Nicolaíta," "Antología de escritores nicolaítas," and "Estudio sobre la literatura Nicolaíta." He passed away in 1962^{2,4-6}.

Table 2. Wards and directors

Type of infected patients	Director of the ward	No. assigned to each ward
Multiple infections	Ignacio López	27
Leper in children and adults	Federico Bustamante	27 bis
Observation	Marco Antonio Barranco	22
Men with venereal diseases	Juan Nepomuceno Castellanos	10
Venereal diseases as well	Francisco Aguirre	11
Typhus-related	Alfonso Altamirano	12
Typhus-related as well	Manuel Cañas	13
Women with venereal diseases	Lamberto Barreda	20
TB patients	Manuel González de la Vega	26
Puerperal fever	Arturo Iturriaga	28
Infected children	Manuel Izaguirre	29
Patients with typhus	Francisco Bulman	30
Lab	S. Morales Pereira, bacteriologist	

Table 3. Heads of infectology from 1914 through 1937

Heads	Period
Ignacio López	Until 1914
Alejandro Martínez Rojas	1914-1916
Carlos Glass	1917
Lamberto Barreda	1918
Salvador Quevedo y Zubieta for a few months, then, Pablo Mendizábal	1919
Gabriel Suzán	1920
Luis Martínez	1921
Germán Troconis Aragón	1922-1924
Cayetano Andrade	1925
Pablo Barrueta	1927-1928
Salvador Ugalde y Cayetano Andrade López	1929-1930
Cayetano Andrade López	1930-June 1937

Back in 1937, Dr. Maximiliano Ruíz Castañeda discovered the vaccine for typhus, and established the Experimental Immunology Laboratory at Hospital General. He conducted research on typhus and brucellosis and created the National Center for Brucellosis. Dr. Ruíz Castañeda was born in Acambay, Mexico, and got his medical degree in 1923. He studied Microbiology at the

University of Paris and the Pasteur Institute, France in 1924 and 1925, respectively. In 1931, he collaborated with Dr. Hans Zinzer in Harvard to develop the typhus vaccine. He administered this vaccine to several individuals in Mexico, and the “Castañeda Vaccine” was also used by the allies in Europe during World War II. His contributions to brucellosis were highly significant and recognized by the World Health Organization. He received numerous recognitions, including the National Science Award in 1948, the National Order of Merit in Ecuador, the Luis Pasteur Medal in Cuba, the Scientific Merit Award in the State of Mexico, the title of “Beloved Son of the State of Mexico,” and the Research Medical Council Award from the Mexican President. He gained recognition from the Phi Sigma Society, the American Society of Immunology, the New York Academy of Medicine, the Society of Exotic Pathology, and the Mexican Society of Geography and Statistics. He served as a Senator for the State of Mexico from 1958 to 1964 and passed away in Mexico City at the end of 1992^{2,4,5}.

Starting September 1, 1937, Dr. Samuel Morones Alba (Fig. 1) was appointed head of the Infectious Diseases Department at Hospital General. Dr. Samuel Morones was born in Aguascalientes in 1907. He graduated as a medical surgeon from the National Medical School in February 8, 1930. In 1935, he continued his education at the Institute of Tropical Diseases in Hamburg, Germany, and later graduated as a malaria

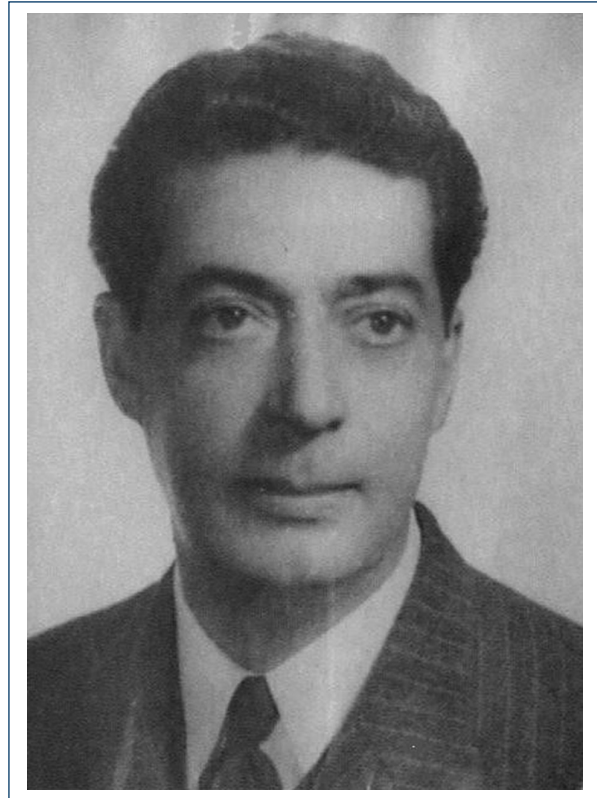


Figure 1. Dr. Samuel Morones Alba.

specialist doctor in Paris. Back in Mexico, he founded the Clinic for Parasitic Diseases. In 1939, he became a member of the National Academy of Medicine, and in 1957, he served as the president of Hospital General Medical Society. He also ran the Contagion Unit at the Spanish Hospital and the Clinical Unit at the Institute of Health and Tropical Diseases. Along with Prof. Joseph Smadel from the Army Medical Center, he successfully treated the world's first cases of exanthematic typhus with chloramphenicol in the infectious disease ward. Dr. Morones could also speak several languages such as Spanish, French, German, English, Italian, Portuguese, Latin, and Greek. His approach to medicine emphasized studying at the patient's bedside with reference books in hand, considering clinical work as the best method to gain knowledge on the patients.

A year after Dr. Morones took office, in 1938, the Infectious Diseases Center was refurbished, resulting in a three-story building. Dr. Samuel Morones Alba designed, developed, and implemented new methods and procedures, initiating anti-infectious therapy, and changing the old concept of infectious procedures.

Dr. Samuel Morones unveiled a commemorative plaque honoring Dr. Ricketts, who contracted the

disease while conducting typhus studies from the blood of patients at the Infectious Disease Unit of Hospital General, subsequently succumbing to the same illness.

In 1942, following instructions from the then-director of Hospital General, Dr. Abraham Ayala González, and the Infectious Disease Unit changed to Ward #28 for Infectious and Contagious Diseases.

Triggered by Dr. Morones, Dr. Daniel Méndez, and Dr. Álvaro Díaz Muñoz created the Infectious Disease Hospital of the Mexican Social Security Institute, which was initially located at the Medical Center (Avenida Cuauhtémoc) and then at the "La Raza" Medical Center. In its early days, this hospital was made possible thanks to the selfless support (without commission, payment, or appointments) of the nursing staff who worked in ward #28 of Hospital General after having been trained on the management of contagious patients.

In the following years, the Infectious Disease Unit stood out for holding extraordinary clinical and medical sessions, with significant participation from doctors such as Samuel Morones Alba, Francisco Higuera Ballesteros, Arturo Orozco Barajas, Roberto Flores Guerrero, Jesús Olvera Vázquez, Carlos Ledezma Zubieta, Carlos Lataban Morales, and guests from other academies and attending physicians. From 1944 to 1968, both Prof. Morones and Dr. Gerardo Varela, Dr. Luis Mazzotti, and Dr. Jorge Olarte served as honorary advisors to the Mexican Social Security Institute.

Unexpectedly, Dr. Samuel Morones passed away on September 23, 1968. On this day, the medical world lost the man who revolutionized medical therapy for the management of infectious and contagious patients turning ward #28 into a cutting-edge unit in Mexican Infectious Diseases. Thanks to his forward-thinking, he gave it identity, organization, continuity, and coherence until the very last day. Dr. Daniel Méndez published an *In Memoriam*, where he emphasized, and I quote: "those of us who were close to Maestro Morones know that he never accepted flattery or praise; that's why these words spoken in his honor are devoid of hyperbole".^{4,6-8}

Academic projection

Dr. Francisco Higuera Ballesteros (Fig. 2) took over ward #28 from 1969 through 1972, overseeing the clinical and educational activities of the unit, and initiating formal and methodological research. He was born in Oaxaca on December 20, 1916. In Mexico City, he

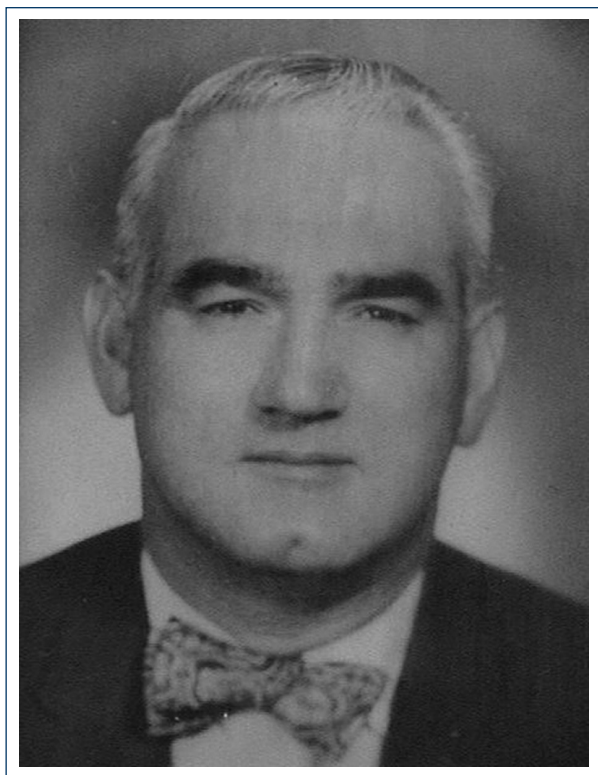


Figure 2. Dr. Francisco Higuera Ballesteros.

completed his Bachelor's degree in Biological Sciences at the National Preparatory School. He studied law for two years at the National Autonomous University of Mexico (UNAM) School of Law, and joined the Medical School in 1940, graduating as a medical surgeon in 1946. As a student, he arrived at Hospital General in 1942. In 1944, he became head of trainees and continued his career as a physician, medical associate, and assistant after passing his exam in Internal Medicine, then becoming an associate physician in Infectiology, to eventually become the Head of the Infectiology Unit. In 1959, he was appointed President of the Medical Society of Hospital General, and in 1972, he became the medical deputy director. In 1974, he eventually became the director of the hospital. He also served as the President of the National Association of Doctors of the ISSSTE and was a founding member of the National Association of Infectiology, member of the Academy of Sciences and Arts in New York, and the author of 53 scientific papers published in national and international journals. Dr. Higuera Ballesteros, Dr. Ernesto Calderón Jaimes, Dr. Jesús Kumate Rodríguez, Dr. José Ruiloba, Dr. Roberto Flores Guerrero, Dr. Miguel Ángel Peredo López Velarde, Dr. Emilio Escárzaga Tapia, and Dr. Pablo Mendoza Hernández founded the Mexican Association of

Infectiology back in 1973, with Dr. Pablo Mendoza Hernández serving as its first president. Dr. Francisco Higuera Ballesteros passed away in Mexico City, in the Infectious Disease Unit of Hospital General in 2002.

In 1972, Dr. Arturo Orozco Barajas took over the Infectious Disease Department until 1980, continuing with activities already going on there. In 1976, ward #28 changed its name to Unit of Internal Medicine and Infectiology #405.

In 1981, Dr. Roberto Flores Guerrero was appointed Head of the Infectious Disease Department, a position he held until 1982. Dr. Flores Guerrero was born in September 8, 1936, in Mexico City. He earned his medical surgeon degree from UNAM Medical School in 1960. In 1966, he completed his training in Infectiology at the University of Berkeley, CA, United States before returning to the Infectious Disease Department. During Dr. Flores's tenure, research was conducted on amebic hepatic abscesses, rabies, tetanus, meningitis, and exanthematous diseases. He served as the President of the Mexican Association of Infectiology, published 48 specialty articles, and, along with Dr. Francisco Higuera Ballesteros, Dr. Jesús Kumate Rodríguez, Dr. Ernesto Calderón Jaimes, and Dr. Miguel Ángel Peredo López Velarde, founded and initiated the work of the Mexican Certification Council in Infectiology^{2,7,9}.

In 1982, the Infectious Diseases Unit was entrusted to Dr. Francisco José Higuera Ramírez who continued the activities devoted to the management of patients, teaching, and research. Starting in 1987, a University Residency in Infectiology was initiated. In 1987, Dr. José Kuthy Porter—director of the hospital—changed the name from Infectious Diseases Unit to Infectious Diseases Department in full compliance with the existing regulations at the time.

Under the helm of Dr. Higuera Ramírez until 1995, the Infectious Diseases Department established an infectious disease intensive care unit (1980), a septic operating room (1985), a radiology unit, and a microbiological and clinical lab.

Dr. Francisco José Higuera Ramírez was born in Mexico City in 1945. He pursued his medical career at UNAM School of Medicine and specialized in internal medicine at the Mexican Social Security Institute. He also earned a master's degree in medical sciences from UNAM. His research focused on tuberculous meningitis, immunosuppression, tetanus, and the beneficial effects of IV emetine. He conducted studies on glycated hemoglobin and on the various clinical uses of antimicrobial drugs.

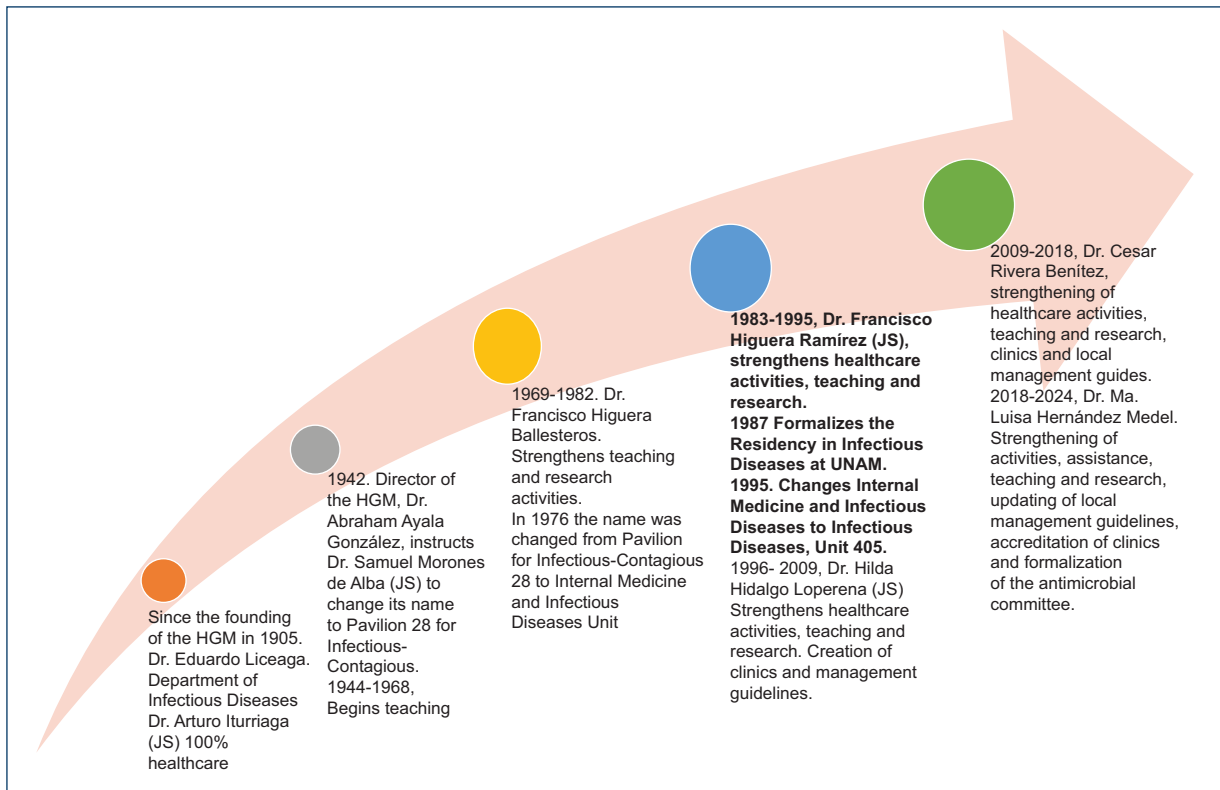


Figure 3. History of the infectious diseases service.

We should mention that as a routine practice since the hospital inception until the 1950s, all patients entering the infectious disease wards would have their heads shaved, body bathed, and their clothing incinerated (delousing for typhus prevention). This practice eventually became occasional until the 1980s when they would be shaved occasionally.

In 1995, Dr. Hilda Hidalgo Loperena took over the Infectious Diseases Department, where she oversaw various activities including patient care, teaching, and research. She reorganized the department, including the outpatient services, inpatient care, Intensive Medical Therapy, Respiratory Therapy, Isolation Units, Surgery, Radiology, Education, and Research. This included in-hospital consultations, the management of nosocomial infections, high-value biological antimicrobials, clinics for conditions such as acquired immunodeficiency syndrome (AIDS) and hepatitis, catheter applications, diabetic foot care, and soft-tissue management. The department also treated transplants cases, emerging diseases, and epidemic outbreaks.

Dr. Hilda Hidalgo Loperena was born in Mexico City in 1947. She completed her training at the Medical School

and graduated as a medical surgeon with honors in 1972. She later specialized in internal medicine at the IMSS and pursued training on infectious diseases at the MD Anderson Cancer Center at the University of Texas and the University of California, Sacramento, CA, United States.

In 2009, Dr. César Rivera Benítez was appointed Head of the Infectious Diseases Department, a position he held until early 2018.^{2,7} Dr. Rivera was born in Mexico City in 1950. He earned his degree from UNAM Medical School in 1975 and completed his internal medicine specialization at Hospital General de México. During his tenure, Dr. Rivera established specialized clinics for the management of hepatitis and human immunodeficiency virus/AIDS, implemented the SALVAR program for patients with AIDS, and restructured the infectious diseases specialization program.

In February 2018, Dr. María Luisa Hernández Medel took over the role of Head of the Infectious Diseases Department. She started her leadership with various actions aimed at creating a positive working environment and maintaining the continuity of the programs that were already running. We should mention that during her tenure, the department treated patients during the COVID-19 pandemic.

Dr. Hernández was born in Pinotepa Nacional, Oaxaca, in 1966. She graduated from the Medical School at the University of Morelos, Toluca, Mexico. She completed her specialization in internal medicine and infectious diseases at Hospital General de México and earned her master's degree in Health Sciences at the National Polytechnic Institute (Fig. 3).

At present, the Infectious Diseases Department is housed on one floor for clinical work, with an additional area on the first floor dedicated to the offices of the medical staff. In the early 1960s, the department underwent renovations that ended in 1963, featuring 72 beds. Toward the end of the 20th century, under the leadership of Dr. Hidalgo and being the hospital directed by Dr. Higuera Ramírez, a remodeling project reduced the size of the Infectious Diseases Department, resulting in 30 inpatient bed, two outpatient consultation cubicles, one intensive care unit, one operating room, and an area for resident physicians.

Conclusion

Over the course of 118 years, Hospital General, along with the country itself, has evolved, much like Medicine and Infectology. The service, with its medical staff, has excelled in academics, providing care to countless individuals, educating numerous generations of doctors and specialists, and conducting extensive research with numerous publications, book chapters, and books being published. All these achievements have elevated the Infectology department at Hospital General to a prominent position in Mexican medicine. Our center has transitioned from dealing with major infectious epidemics to the epidemiological transition, where chronic and degenerative diseases are becoming increasingly prominent. Infectology today and in the future must remain vigilant trying to understand and manage the infections of the past, always with the potential of resurfacing today. It must also be prepared to address diseases associated with immunosuppression and those due to chronic and degenerative conditions. This includes remaining vigilant about emerging infectious diseases and vector-borne illnesses, which currently pose significant morbidity and mortality issues. We must also be prepared for the imminent problem of bacterial resistance and nosocomial infections, along with present epidemic outbreaks such as the H1N1 influenza virus of 2009 and the COVID-19 pandemic

(beginning of 2020). The Infectology Service at Hospital General de México has responded effectively to these recent major infectious challenges from typhoid to COVID-19^{2,4,6,10,11}.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

Ethical disclosures

Protection of people and animals. The authors declare that no experiments have been performed on humans or animals for this research.

Data confidentiality. The authors declare that no patient data appears in this article.

Right to privacy and informed consent. The authors have earned the informed consent of the patients and/or subjects referred to in the article. This document is in the possession of the corresponding author.

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