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Syphilis in Coimbra at the beginning of the 20th century. The importance of hospital records for the study of the disease¹

Sífilis em Coimbra no início do século XX. A importância dos registos hospitalares para o estudo da doença

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Abstract Syphilis is a chronic sexually or congenitally transmitted infection, with a well-documented clinical past, having been one of the major public health problems in Europe. In Portugal, there is a lack of data regarding the number of individuals infected by syphilis, or even about the characteristics of the disease and the infected people, in past official statistics. Hence, the main purpose of this study was to appraisal some of these omissions in order to extend our knowledge of this infection in the past. The aim was to obtain data about the disease in the first years of the 20th century, as well as the demographic and the socioeconomic profile of the

Resumo A sífilis é uma infeção sexualmente transmissível, crónica e com transmissão congénita que constituiu um sério problema de saúde pública na Europa. Em Portugal pouco se sabe sobre os números de indivíduos afetados, bem como sobre a caracterização da doença e dos doentes. Desta forma, os objetivos principais deste trabalho visam tentar entender e, se possível, colmatar estas falhas, apresentando-se os reais números da doença nos primeiros anos do século XX, bem como a caracterização demográfica e socioeconómica dos indivíduos afetados. Por outro lado, pretende-se proceder a uma caracterização da doença, nomeadamente do tipo de lesões

¹ This paper is based on the author's PhD dissertation (Lopes, 2014).

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affected individuals. The intention was also to characterize the disease, identifying the most frequent lesions and their locations in the human body. Among the patients who were hospitalized in the Hospitals of the University of Coimbra (HUC) between 1904 and 1937, 5.9% were diagnosed with syphilis. Most of them (89.3%) with the acquired form of the disease, which affected mainly single young adults (20–39 years) independently of their sex. Congenital syphilis was detected mainly in children (0–4 years). Most hospitalizations for congenital syphilis (53.9%) occurred when the disease was in its tertiary form, which did not happen in the acquired form of the disease (29.5%). The most frequent forms of tertiary syphilis were malignant, affecting 33.4% of patients with the disease at its most advanced stage.

Keywords: Paleopathology; history of medicine; archives; Hospitals of the University of Coimbra.

Introduction

Syphilis is a chronic infectious disease caused by the *Treponema pallidum* (Lautenschlager, 2006). It can be classified as acquired or congenital, depending on whether the transmission occurs through direct contact between individuals, usually sexual contact, or passed from mother to child via placental invasion (Singh and Romanowski, 1999; Lautenschlager, 2006).

mais frequentes e da sua localização no organismo. De entre os internamentos efetuados nos Hospitais da Universidade de Coimbra (HUC) entre 1904 e 1937, 5,9% foram diagnosticados com sífilis. A maioria dos doentes (89,3%) com a forma adquirida, a qual afetou sobretudo jovens adultos solteiros (20–39 anos), sem distinção entre sexos. A sífilis congénita foi detetada sobretudo em crianças (0–4 anos). A maioria dos internamentos por sífilis congénita (53,9%) ocorreu quando a doença se apresentava na sua forma terciária, o mesmo não sucedendo na forma adquirida da doença (29,5%). As formas de sífilis terciária mais frequentes foram as malignas, afetando 33,4% dos portadores da doença no seu estágio mais avançado.

Palavras-chave: Paleopatologia; história da medicina; arquivos; Hospitais da Universidade de Coimbra.

Traditionally, the progression of the disease is characterized by a clinical evolution in three symptomatic phases and one latent phase (Lautenschlager, 2006). After the relatively innocuous, but highly contagious early stages of the disease, there is a latent period that can last up to 50 years (Rodrigo and Silva, 2003; LaFond and Lukehart, 2006; Fenton et al., 2008). Untreated syphilis naturally develops into its tertiary stage and any organ may

be affected (Rodrigo and Silva, 2003). The tertiary stage is characterized by the appearance of syphilitic gummas, which consist of nodular foci, like tumors, filled by areas of necrosis with the consistency of gums (Brown and Frank, 2003). Although gummas may be extremely aggressive, they do not lead to death, and they are involved in the so-called benign manifestations of syphilis, as opposed to malignant forms that affect the central nervous (neurosyphilis) or cardiovascular system, usually resulting in the individual's death (Brown and Frank, 2003; LaFond and Lukehart, 2006).

Despite the interest in syphilis in the civil and scientific community during the past two centuries, well-illustrated in newspapers, pamphlets and journals (Lopes, 2014), the number of patients in Portugal in the 20th century is unknown. According to Campos (1924), syphilis would account for a third of human pathology. Trovar de Lemos reported, in 1906, that more than 10% of men in Lisbon were suffering from the disease (Pilão and Tacão, 2011). During a lecture at the "1st Portuguese Week of Hygiene", Trovar de Lemos mentions the unknown number of infected individuals in Portugal, highlighting the 35420 medical appointments carried out at the Social Hygiene Dispensary of Lisbon in just over a year (Lemos, 1942). In 1945, at the opening of the Holiday Course on syphilis, the large number of patients with syphilis in Portugal is again high-

lighted without concrete numbers being advanced:

Few illnesses [are] more important at this time in our country than this syphilis! The percentage of syphilitics, the number of severe forms, the number of deaths caused by it are enormous. Its repercussion in the offspring, in the coming generations, will be very serious. (Furtado, 1945: 189)

Objectives

The early 20th century was a period of great importance for the medical knowledge of syphilis. The discovery of the infectious agent, in 1905, and the development of increasingly reliable forms of diagnosis led to the long-awaited path to healing. Syphilis was recognized as an extremely debilitating disease in society but there was not any compilation of facts associated with it in Portugal. This lack of information was the starting point for the research work here presented and discussed. Because it is a proposal that would easily reach unrealizable proportions, it was necessary to define a spatiotemporal limit (Lopes, 2014). So, the study focused in the city of Coimbra, using the archives of the Hospitals of the University of Coimbra (HUC), the Conchada Municipal Cemetery records (CMC), and two osteological identified collections, the International Exchanges Collection of

skulls (IEC) and the Identified Skeletons Collection (ISC), both stored at the Life Sciences Department of the University of Coimbra. The data presented are related only to those obtained in the records of the Hospitals. The choice of the time interval was centered between the years 1904 and 1937, being the oldest and most recent death dates, respectively, of the individuals present on the osteological collections (Lopes, 2014).

Thus, the two main goals of this work was to determine the incidence of syphilis in the population of Coimbra in the early years of the 20th century and the characterization of the disease and the patients.

Materials and methods

The records of the Hospitals of the University of Coimbra

The clinical documentation and patients' admission records in the HUC are part of the documentary fund of the University of Coimbra and are deposited in the University Archive. The patients' records (women and men), from 1904 to 1937, were analyzed (Lopes, 2014). These record books contain all the admission data, presenting a set of information regarding the biographical and clinical data of each hospitalized individual (Figure 1). Among the available data, there is the patients' name and filiation, gender, age, marital status, profession, place of birth and residence. With regard

to clinical data, the records provide the patients' dates of admission and discharge from the hospital, diagnosis, patients' discharge status (cured, improved, in same state or deceased), ward and the condition of the patients' admission ("poor"; "first, second or third class pensioner"; "urgent"; "with a certificate from the chamber of [...]"; "imprisoned by the Public Prosecutor") (Lopes, 2014).

All data in the record books were collected and placed in an Excel database and then analyzed using the SPSS statistical program.

Results

Demographic characterization of the sample

Of the 114307 hospitalizations in the HUC during the 34 years under study, 58861 (51.49%) were men and 55446 (48.51%) were women. During that period, 6705 admissions, corresponding to 5.87% of the total, refer to patients diagnosed with syphilis. Out of these, 3691 (55.05%) were women and 3014 (44.95%) were men. The application of the χ^2 test to determine the independence of the variables revealed that hospitalizations were independent of sex ($\chi^2=-0.900$, $p=0.368$, $N=6705$).

From the 6705 hospitalizations due to syphilis, 4663 patients were hospitalized more than once during the period under study — 2297 women (49%) and men 2366 (51%).

N.º de ordem	Entrada, Saída e Falecimento	DATAS				Nome e filiação do doente	Idade	Estado civil	Profissão	Naturalidade
		Ano	Mês	Dia	Horas					
111	Entrada 19/09/1911 Saída ... Falecim.º	1911	Set	19		Caran, Yolla, João, 195 1ª Esq.			Coimbra Freg.ª S. Antão Conc.ª Coimbra Dist.ª Leão	
112	Entrada 19/09/1911 Saída ... Falecim.º	1911	Set	19		Castro	Correio		Coimbra Freg.ª S. Antão Conc.ª Coimbra Dist.ª Leão	
113	Entrada 19/09/1911 Saída ... Falecim.º	1911	Set	19					Coimbra Freg.ª S. Antão Conc.ª Coimbra Dist.ª Leão	
114	Entrada 19/09/1911 Saída ... Falecim.º	1911	Set	19		Castro	Correio		Coimbra Freg.ª S. Antão Conc.ª Coimbra Dist.ª Leão	
						Caran, Yolla, João, 195 1ª Esq.			Coimbra Freg.ª S. Antão Conc.ª Coimbra Dist.ª Leão	

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Residência	Diagnóstico	Resultado	ENFERMIA		Observações
			Nome	N.º de ordem	
Coimbra Freg.ª Leão Conc.ª Coimbra Dist.ª Leão	Griphe - Coqueluche Tuberculose pulmonar	Coqueluche Quarentena	P. M. H.		admitido por suspeição admissão de febre feia de Coqueluche
Coimbra Freg.ª S. Antão Conc.ª Coimbra Dist.ª Leão	Griphe	Coqueluche	P. M. H.		admitido por suspeição admissão de febre feia de Coqueluche
Coimbra Freg.ª Leão Conc.ª Leão Dist.ª Leão	Difteria	Quarentena	D. S. M.		admitido por suspeição admissão de febre feia de Coqueluche
Coimbra Freg.ª Leão Conc.ª Leão Dist.ª Leão	Difteria e dente	Quarentena	D. S. H.		admitido por suspeição admissão de febre feia de Coqueluche
Coimbra	Tuberculose				admitido por suspeição admissão de febre feia de Coqueluche

Figure 1. Patient registration book in the Hospitals of the University of Coimbra.

The youngest person to be admitted to the HUC was a newborn with only a few hours of life and the oldest was a 88 years old woman. The mean age was 27.9 years old for women, and 32.4 years old for men. The most frequent age group was that of young adults, between 20 and 29 years old, including 39.8% women (911/2290) and 36% men (851/2364) (Figure 2).

Considering only the 410 cases of hospitalization in minors (up to 18 years old), the most represented age group was the one between 11 and 17 years (N=207), followed by the group under 5 years old (N=137). Most patients in the first hospitalization were single, for both sexes —50.1% women (1288/2297) and 49.1% men (1162/2366) —, immediately followed by married people (27.5% women and 38% men). The divorced were less

frequent, only 0.9% women (20/2297) and 0.8% men (18/2366). About 97.9% (4567/4663) were born in mainland Portugal, one was born in the Azores islands and the remaining were born in Brazil (N=36), Spain (N=12) and in other European and African countries. For 16 individuals, the birthplace is not known, while in other 19 “foreigner” is the only indication.

All patients inhabited in mainland Portugal during the first hospitalization. Most lived in the district of Coimbra (N=3273; 70.2%) and in the neighboring districts, particularly Aveiro, Viseu and Leiria. In 109 cases, the residence is not mentioned in the records. Within the municipality of Coimbra — which, by itself, integrates 47.9% (2232/4663) of the total sample —, 1938 (86.8%) dwelt in the urban parishes of Santa Cruz (N=1015), São

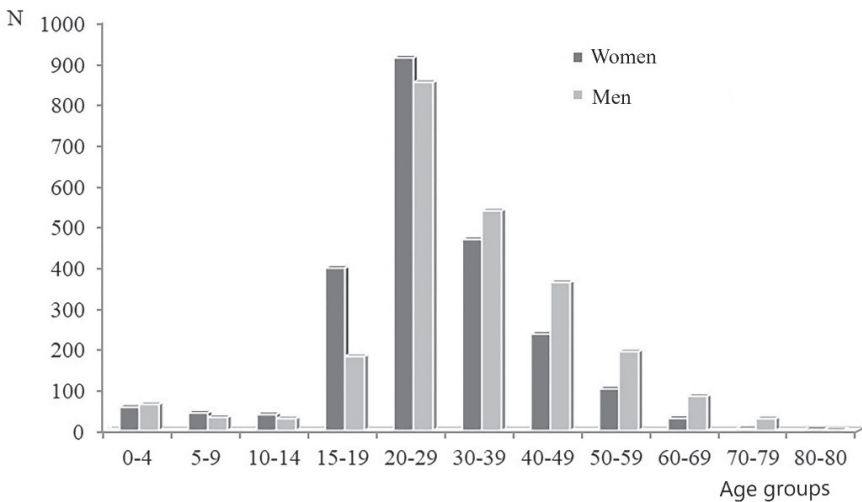


Figure 2. Distribution of patients by age and sex, in the first hospitalization.

Bartolomeu (N=222), Almedina (N=169), Sé Nova (N=426) and Santo António dos Olivais (N=106).

Socioeconomic characterization

In order to infer the socioeconomic status of the individuals under study, two of the variables registered were used: the profession and the conditions of admission of the patient to the hospital.

In women, there is a lower variety of professional occupation than in men. The most frequent profession in women (N=1008; 43.9%) is housewife, followed by prostitute (N=659; 28.7%) and maid (N=324; 14.1%); the remaining are divided by activities such as farmers, day laborers, seamstresses, among others non-specialized professions. There is also a reference to a landowner, who was a widow, so it may be assumed that she may have inherited her husband's property. For 11 women, the profession is not known, nine were considered "without profession" and 136 were girls under 16 years old.

For men, the range of occupations is larger, with some specialized jobs such as medical doctors, lawyers, pharmacists, and one ecclesiastic. There are also other professions necessarily performed by literates, such as postmen or office employees. Still, the most frequent are non-specialized occupations, showing low socioeconomic status, such as "workers and day laborers" (N=769, 32.5%), and traders (N=137, 5.8%). There are 126 boys

under 16 years old, while 26 men are referred to as "without profession".

The youngest children to be classified as workers were only 12 years old, more specifically two "maids" and a "day laborer". A 14-year-old described as a clandestine prostitute is also emphasized. Still, most women described as "prostitutes" were between 20 and 29 years old (N=347, 52.8%) and 15 and 19 years old (N=243, 37%). Only two women described as prostitutes were older than 50 years old by the time of the first hospitalization.

The economic conditions of admission were divided in four classes, according to the records of the HUC — poor, third-class pensioners, second-class pensioners, and first-class pensioners. Patients classified as poor correspond to 86.3% (4020/4658), thus representing the large majority of admissions. Within the patients who paid for the hospital stay and the treatments there administered, the third-class pensioners are the most frequent, while the first-class pensioners, representing the richest, represent only 0.6% (N=30) of the total.

Distribution of hospitalizations per year

The distribution of patients with syphilis per year of the first hospitalization is outlined in Figure 3. The analysis of the graph shows a large increase in men's admissions from 1917 to 1922. In women, this increase started a little later, between 1919 and 1922. In 1923,

the number of patients admitted to HUC with a diagnosis of syphilis decreased to almost half and remained almost constant during the last years of the study.

Hospitalizations per patient

Of the 4663 patients diagnosed with syphilis, 3690 (79.1%) were admitted only once, while one woman had a maximum of 23 hospitalizations. On average, there were 1.44 admissions per patient. There is a significantly higher average of hospitalizations in women than in men ($t[3826.73]=8.589$; $p<0.001$). According to the 95% $[0.257; 0.409]$ confidence interval, women had, on average, between 0.257 and 0.409 more hospitalizations than men.

The length of hospital stays varied between 0 ($N=19$) and 906 ($N=1$) days, with a mean of 53.5 days. The most frequent

value in the sample is 34 days. Of the 19 individuals with zero days stay at the hospital, seven (36.8%) died on the same day of admission, one fled the ward after registration and there is no information regarding the remaining 11. Women stayed longer at the hospital than men, a statistically significant difference ($t[6691.132]=9.289$; $p<0.001$), with a confidence interval of 95% $[9,814; 15,064]$. Of the 6705 hospitalizations, 27 (0.40%) — 10 men and 17 women — stayed for one year or more.

Clinical data analysis

Acquired syphilis versus congenital syphilis

The information in the hospital records that allowed the classification of patients by type of syphilis only exists for

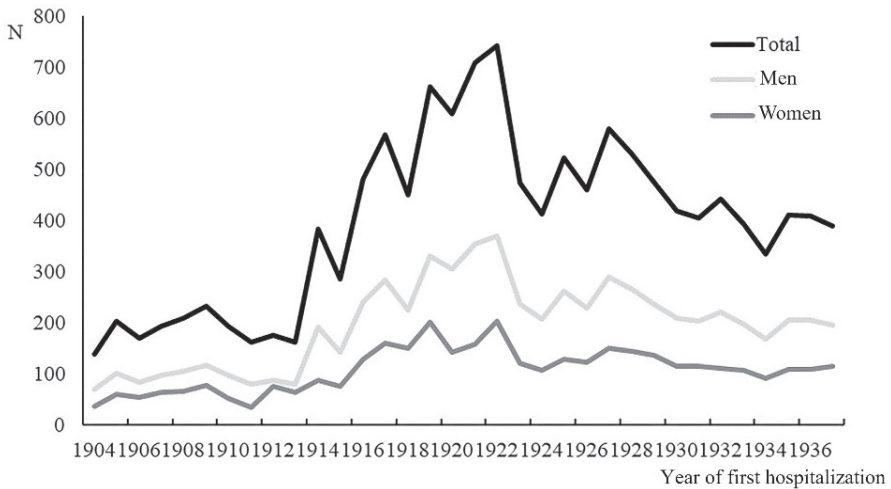


Figure 3. Distribution of patients with syphilis per year of the first hospitalization and by sex.

38.9% (N=1813) of the individuals in the sample. Among them, 194 (10.70%) suffered from congenital syphilis, while the remaining 1619 (89.3%) acquired the disease by sexual contact. Of the 194 individuals diagnosed with congenital syphilis, 49.48% (N=96) were female and 50.52% (N=98) were male. For patients identified as having acquired syphilis, 51.27% (N=830) were female and 48.73% (N=789) were male. The mean age of hospitalized patients with congenital syphilis was 10 years old, ranging from 0 to 56 years and with a standard deviation of 11.1. The age of patients with the acquired form of the disease varies between 11 and 80 years, with a mean of 27.3 years and a standard deviation of 11.1.

Stages of syphilis

The determination of the stage of syphilis was attempted for all admissions

in the HUC, but it was only successful in 54.3% (N=3637) of the total hospitalizations and in 35% (N=1632) of the patients. Table 1 represents the distribution of patients counted by type of syphilis (congenital versus acquired) in relation to the state of the disease. Most of the cases identified in patients with congenital syphilis had tertiary (48.5%) or secondary (45.5%) syphilis. In this group, there was not, as would be expected, any case of primary syphilis. With respect to the group of individuals infected after birth, the most representative disease stage was secondary, with 83.4% of the cases, followed by primary syphilis (12.3%), while tertiary stage was only identified in 9 individuals (1%). Simultaneous cases of primary and secondary lesions were detected in 57 patients, mostly (N=48) men.

The Kruskal-Wallis non-parametric test was used to assess whether the age of the patient significantly influenced

Table 1. Distribution of patients by the stages of syphilis and by sex, for both congenital and acquired disease.

Syphilis stage	Congenital						Acquired					
	Women		Men		Total		Women		Men		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Primary	0	0.00	0	0.00	0	0.00	18	2.19	179	23.07	197	12.32
Secondary	6	37.50	9	52.94	15	45.46	793	96.36	541	69.72	1334	83.43
Primary and secondary	0	0.00	0	0.00	0	0.00	9	1.09	48	6.18	57	3.56
Latent	1	6.25	1	5.88	2	6.06	1	0.12	1	0.13	2	0.13
Tertiary	9	56.25	7	41.18	16	48.48	2	0.24	7	0.90	9	0.56
Total	16	100	17	100	33	100	823	100	776	100	1599	100

the stage of syphilis at hospital admission. Statistically significant results were obtained for hospitalizations whose patients suffered from acquired syphilis: $\chi^2_{\text{KW}}(8)=4957620$; $p<0.001$; $N=592$. The analysis for congenital syphilis, is clearly distinct, concluding that, in this group, the age of the individual does not influence the stage of the disease at the time of admission: $\chi^2_{\text{KW}}(6)=5788$; $p=0.447$; $N=39$. There is a decrease in the number of cases of acquired primary syphilis as the age group increases, while the secondary cases, which are the most frequent in all groups up to 30–39 years, gradually decrease their relative weight in adulthood (Figure 4). The relative frequency of tertiary syphilis increases significantly with age, becoming the most common at the age of 40–49. In congenital syphilis, tertiary cases are more frequent in all age groups, except for 0–4 years, in which the secondary stage is more frequent.

The time elapsed between different diagnoses regarding the stage of syphilis was obtained for a very limited number of individuals with multiple admissions, all of them referring to patients with acquired syphilis. In 39 individuals, 5 women and 34 men, it was possible to estimate the time elapsed between the primary and secondary stages, with an average of 0.72 years (about 8.5 months) for women and 0.96 years (11.5 months) for men (Table 2). Regarding the time elapsed between the secondary and tertiary phases, observed in 28 individuals — 21 women and 17 men — the average was 12.35 years for men and 9.19 years for women. In 10 individuals, primary syphilis was diagnosed in a first hospitalization and tertiary syphilis in later hospitalizations, without the intermediate phase being detected. For the nine male subjects in this situation, a mean value of 19.89 years was found between diagnoses. The only woman in this

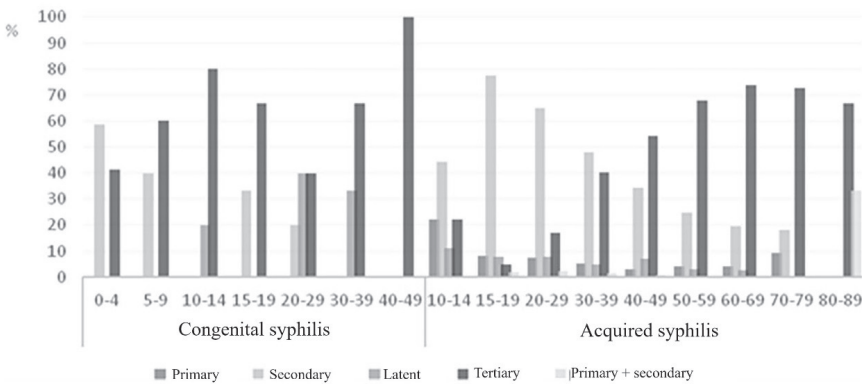


Figure 4. Distribution of the hospitalizations per stage of syphilis by age group and by type of syphilis.

situation had 6 years elapsed between diagnoses. The application of Student T-Test, with Welch correction, to test the effect of sex in time elapsed between phases did not reveal statistically significant differences for the parameters, although the mean values for men were always slightly higher than for women (Table 2).

Classification of tertiary syphilis by body location

In the classification of tertiary syphilis by body location, it was decided not to distinguish between congenital and acquired syphilis. Not only tertiary manifestations are quite similar, but there are many cases of tertiary syphilis of unknown origin limiting the possibilities of the study. The classification of tertiary syphilis by type of organ or affected system, according to the admission books and clinical records, was achieved in 787 hospitalizations and 588 patients. The tertiary manifestations of syphilis are mainly present in the central nervous system in the case of men and in the group "other types attacking soft tissues" (which essentially includes ulcerous or gummatous lesions of the soft tissues) in women. Neurosyphilis (*tabes* and general paralysis) and cardiovascular and cerebral syphilis, the malignant forms of the disease, are responsible for 5.43% (364/6705) of the admissions in the HUC, representing 36.70% (280/763) of patients admitted with tertiary syphilis (Table 3).

Table 2. Time elapsed in the transition between stages of syphilis by sexes.

Sex	Transition between stages									
	primary — secondary			secondary — tertiary			primary — tertiary			
	N	Mean	Standard deviation	N	Mean	Standard deviation	N	Mean	Standard deviation	
Women	5	0.72	0.53	21	9.19	4.09	1	6.00	6 years	
Men	34	0.96	0.79	17	12.35	6.94	9	19.89	6–32 years	8.84
Total	39	0.93	0.76	38	10.61	5.69	10	15.80	6–32 years	9.02

Table 3. Classification of tertiary syphilis by organ or affected system, and respective frequencies by hospitalization and patients, by sex.

Type of tertiary syphilis	Hospitalizations						Patient					
	Women			Men			Women			Men		
	N	%	N	%	N	%	N	%	N	%	N	%
Neurosyphilis (tabes and paresis)	36	0.98	191	6.34	227	3.39	27	1.17	141	5.96	168	3.60
Cardiovascular	19	0.51	53	1.76	72	1.07	14	0.61	45	1.90	59	1.26
Cerebral	20	0.54	45	1.49	65	0.97	16	0.70	37	1.56	53	1.14
Pulmonary	5	0.14	17	0.56	22	0.33	3	0.13	10	0.42	13	0.28
Liver	17	0.46	36	1.19	53	0.79	11	0.48	32	1.35	43	0.92
Muscle	4	0.11	20	0.66	24	0.36	4	0.17	16	0.68	20	0.43
Bones	57	1.54	60	1.99	117	1.74	46	2.00	44	1.86	90	1.93
Other types attacking soft tissues	101	2.74	106	3.52	207	3.09	64	2.79	78	3.30	142	3.05
Unknown location	93	2.52	210	6.97	303	4.52	56	2.44	119	5.03	175	3.75
Non-tertiary syphilis / unknown	3339	90.46	2276	75.52	5615	83.74	2056	89.51	1844	77.94	3900	83.64
Total	3691	100	3014	100	6705	100	2297	100	2366	100	4663	100

Patient status at hospital discharge date

The classification of the patient status at discharge is registered in 6625 hospitalizations, of which 3629 from women and 2996 from men. The most frequent result refers to “improved” or “cured manifestations”, with 71.85% of women hospitalizations and 70.48% of man (Table 4). The percentage of patients considered as “cured” was 20.1%. It should also be mentioned the small percentage (N=117; 1.74%) of individuals who died in the hospital due to the disease.

Treatments

The treatments prescribed to each patient are not described in the admission records but in the individual clinical records, which is why they were not collected for all hospitalizations. The clinical records analyzed were 28 regarding women and 36 regarding men. During this analy-

sis, it was found that the treatments used for syphilis changed little over the period under study. In fact, the therapeutic was initially limited to the topical or intravenous application of mercury, especially in the form of mercury cyanide or mercury benzoate. In 1910, the application of arsenic compounds (probably salvarsan or neo-salvarsan, although not identified by name) was first mentioned, even though it was not the norm followed in all patients. From 1918 on, the neo-salvarsan appears in all prescriptions, although always accompanied by an initial injection of mercurial cyanide to 4%. This scheme, composed of mercury together with the arsenic compound, has been maintained for more than a decade. Only in 1924 the first case of treatment with exclusive use of neo-salvarsan appeared.

As would be expected, each patient had specific treatments for complications of the disease, such as digitalis in patients with cardiovascular disorders.

Table 4. Classification of hospitalizations by patient status after hospital discharge and by sex.

Patient status at discharge	Hospitalizations					
	Women		Men		Total	
	N	%	N	%	N	%
Healed	748	20.27	600	19.91	1348	20.10
Improved	2652	71.85	2074	68.81	4726	70.49
In the same state	175	4.74	252	8.36	427	6.37
In worse condition	2	0.05	5	0.16	7	0.10
Deceased	52	1.41	65	2.16	117	1.75
Unknown	62	1.68	18	0.60	80	1.19
Total	3691	100.00	3014	100.00	6705	100.00

The therapy for syphilis remained almost unchanged until 1937, the last year addressed in the present study.

Discussion

The period under study, between the end of the 19th century and the beginning of the 20th century, was marked by moments of great social, political and economic instability (Frada, 2005). The unsustainable increase in the cost of living, the exorbitant tax burden, the reduction of wages and the extension of working hours have rendered the living conditions of the Portuguese working people almost unbearable (Cabral, 1979; Frada, 2005). Consequently, people's health was affected, and the general population had precarious health (Vieira, 1999). In 1885, the military conscription selection rejected nearly half of the young men due to short stature, lightweight or health problems (Vieira, 1999). The First World War aggravated the economic situation of families, particularly the poorest, and the country was devastated by hunger and misery, making people susceptible to diseases and epidemics (Frada, 2005).

As a direct consequence of the living conditions, the health of the Portuguese was also precarious. There were several epidemics, although almost all of them of limited spatial scope, except for the influenza pandemic in 1918 (Correia, 1938; Ferreira, 1990). However, despite the seriousness of these outbreaks, it was

the so-called social diseases that caused the most terror in the population, with tuberculosis and syphilis assuming the lead that lasted until almost mid-century.

Although several reports indicate a high number of people infected with syphilis in the early 20th century, the truth is that the exact numbers are unknown. Rocha Brito (1935) states that, although there were no statistics because it was not a compulsory notifiable disease, there would be more than 600000 patients in the country. The author estimated this number based on the statistics of several European countries where the prevalence of the disease was 10% of the total population. Following this reasoning, the district of Coimbra should have, by the middle of the century, more than 40000 patients and, going a little further, based on the inhabitants registered in the 1940 census, in the municipality of Coimbra (N=86736 inhabitants) (INE, 1945) there would be over 8600 people with syphilis.

Over the 34 years comprised in this the study, 114307 admissions were carried out at the Hospitals of the University of Coimbra (HUC). Among them were 6705 with a diagnosis of syphilis, corresponding to 5.9% of the total. These hospitalizations concerned 4663 patients, of which 973 (20.9%) were hospitalized two or more times with a similar diagnosis. Women had, on average, 1.61 hospitalizations (ranging from 1 to 23) and men a little less, 1.27 (with a variation between 1 and 21), and it was concluded that both

age and the year of hospitalization and sex were directly related to the number of hospitalizations. Most women who suffered multiple hospitalizations were prostitutes, forced to weekly sanitary visits (Germano, 2008), which, in Coimbra, and according to the HUC records, were carried out by the doctor “general inspector of the prostitutes”. If in these consultations it was found that some of these women had signs or symptoms of syphilis or other contagious diseases, they would be immediately taken to the hospital and admitted for treatment (Germano, 2008). This procedure explains the large number of hospitalizations, being the second most represented professional group in females, and the higher frequency of hospitalizations per patient in women. The increase in hospitalizations with age is understandable, since the risk of tertiary complications of the disease increased with age and people would go to the doctor more frequently.

The length of hospitalizations ranged from 0 to 906 days, with an average of 59 days for women, higher than the mean of 46.6 days for men, differences that proved to be statistically significant. Along the years of the study there was a decrease in both the number of hospitalizations per year and in the average number of days of hospitalization. This may be related to a better knowledge of the disease by clinicians, as well as with the offer of treatments outside the hospital, such as in antivenereal dispensaries

which were emerging a little throughout the country, including in Coimbra (Pilão and Tacão, 2011).

The variation in the percentage of hospitalizations for syphilis over the years assumes great importance for this time period, since the years corresponding to the First World War are included, as well as the years immediately following. The increase in the incidence of syphilis after the First World War is mentioned by several authors, such as Santos (1934) or Beardsley (1976). The analysis of the number of hospitalizations per year leaves no doubt that the number of people infected by syphilis increased sharply in the post-war period. Therefore, it seems to confirm the thesis, defended by Santos (1934), that the soldiers returning to Portugal would have been infected in large numbers, transmitting the disease to their partners. In fact, another factor that allows us to consolidate this theory is the number of children who were victims of congenital syphilis, since 44% of the total of non-adult individuals deceased over the study period died between 1918 and 1924, 50% of them with less than 12 months. Also, the analysis of infant mortality in Portugal, published by the National Statistics Institute, indicates that the average mortality rates up to 1 year of age from 1918 to 1920 was 18.8%, contrasting with 15% in the previous three years and 15.4% over the following three years (INE, 1939). Even excluding the year 1918, in which many

children died from influenza, the average of 1919/1920 was 17.7%, considerably higher than the years that mediate this period. These results indicate that the war was a major factor in the spread of syphilis in the Portuguese society.

The characterization of the demographic and epidemiological profile of syphilis in a period prior to the existence of antibiotics enables comparison with recent epidemiological data and, ultimately, detects changes resulting from the use of penicillin and derivatives in their treatment. The most recent Portuguese data, obtained from the analysis of reports on compulsory notifiable diseases, indicate that, of the 2117 new cases of acquired syphilis declared between 2013 and 2016 to the competent authorities, 74.5% are men (DGS, 2017). Regarding the age of infection, syphilis essentially affects the sexually active population in the 25–45 age group, with 47% (N=989) of the cases to be referenced at this time of life (DGS, 2017).

In this study, the proportion between sexes in hospitalized individuals is 55% of women to 45% of men; however, when the analysis is done per patient, the proportion is slightly closer today, with 49% women and 51% men. Regarding age, the mean at the first hospitalization was 27.9 years old for women and 32.4 years old for men. The age group most represented was 20–29 years old, followed by the 30–39 years old. About individuals under 18 years of age, the highest num-

ber of cases occurred between 11 and 17 years, most probably, in most cases, after the initiation of their sexual life, followed by the group under 5 years old, when the manifestations of congenital syphilis are more severe (LaFond and Lukehart, 2006). Although the numbers of syphilis have declined over the years, the demographic characterization of the individuals affected by it has not changed considerably.

It was found that about half of the adults were single (50.1% women and 49.1% men), followed by the married ones, and a very small portion of divorced. Regarding the birthplace of the patients, the majority (about 98%) were born in mainland Portugal and almost half of them in the district of Coimbra. They all lived in Portugal at the time of the first hospitalization, 70% of which in the district of Coimbra. Of these, 68.2% lived in the municipality of Coimbra, and, among them, 86.8% had their habitual residence in the urban parishes (Santa Cruz, São Bartolomeu, Almedina, Sé Nova and Santo António dos Olivais).

In the early 20th century, society in general believed that syphilis was a disease of the “most civilized” environments, well-known in the cities but unknown to the villagers (Crisóstomo, 1921). Despite being always associated with prostitution, more abundant in urban centers, syphilis was, nevertheless, well-known in rural areas, where it reached a high number of people, who, however, visited more often the healers and neighbors

than the doctor (Mesquita, 1907). As expected, whether for a matter of ease of mobility or even a matter of the number of inhabitants, most of the patients who came to the HUC were from areas closer to the hospital, thus more urbanized.

The inverse association between socioeconomic status and mortality or morbidity of a population is recognized by most authors who deal with these issues (Duncan et al., 2002; Cardoso, 2005/2006). The traditional socioeconomic indicators are based on education, income and professional occupation (Geyer and Peter, 2000; Duncan et al., 2002; Cardoso, 2005/2006), which are difficult to determine in the historical populations, constituting the archives the only way to establish it (Cardoso, 2005/2006). The study of the HUC registers provided two types of useful information to solve this matter: the occupation and the conditions of admission of the patient to the hospital. For most individuals, the level of education is impossible to determine based solely on the data collected.

The first difficulty was related to the categorization of professions. Many have ceased to exist, others, even if they remain today, have lost, or won, status with the passage of the years. Cascão (2011) did a social stratification of the most common professions in the first half of the 20th century, considering that the lower classes consisted of beggars, prostitutes, and many widows without income; undifferentiated workers and laborers; that

the upper middle class would include liberal professionals, individuals belonging to the army and industrials; and that the wealthier classes would include property owners, the high ranks of the civil service, traders, and entrepreneurs. Thus, of the 2198 men whose profession was identified, 297 (13.5%) belonged to the wealthiest class, followed by 286 (13.0%) from the middle class, 1610 (73.3%) belonging to the so-called working class; and five men were counted as beggars or indigent. Although the relative values obtained for the lower socioeconomic class individuals appear to be substantially high, when a χ^2 test was applied, in order to determine the independence of the variables, it was found that, in fact, for both the upper and middle classes, the mean values were higher than the statistically expected, which did not happen in the lower class. According to this, men from the higher classes were, in relative terms, the most affected by syphilis.

Another difficulty was related to female occupations. Among the women infected with syphilis, occupations were mainly distributed by three groups: domestic, prostitutes and maidservants. If it is easy to guess that prostitutes and maidservants would occupy a very low social stratum, the domestic ones would depend on their husbands or fathers, regarding whom there is no information available.

From the above, it can be concluded that, of the 2141 women with a known

occupation, 1132 would be included in a low social class and only one (property owner) can be considered as belonging to a higher class; the remaining 1008 are referred as domestics. However, it is in the female group that the most important occupation for the study of syphilis is found. Prostitutes were recognized as the main vector of transmission of the disease, which is well documented in the works “Da prostituição na cidade de Lisboa” [On prostitution in the city of Lisbon] by Francisco Cruz (1841) and “Os bons velhos tempos da prostituição em Portugal” [The good old times of prostitution in Portugal] by Alfredo Pessoa (1976 [1887]).

The exact number of prostitutes providing their services is not known. Despite the legalization and regulation of the profession, many were considered clandestine, unregistered prostitutes, who often supplemented the meager wages obtained in their main occupations with the practice of prostitution (Vieira, 1999). An opinion shared by Lemos, who considered that there was no serious desire on the part of society to care for these women who were often thrown into prostitution “because of the unemployment crisis”, adding that “it is rare that women who earn enough fall into prostitution” (Lemos, 1937: 32). Lemos also points out that these women always had a modest origin, “poor and often even miserable”, without education, who departed in search of a better life in the city, where they found “a society that did not protect

them sufficiently and where they fled in the mirage of money easily reached by prostitution” (1937: 32–33).

The only exhaustive study carried out with prostitutes in the city of Coimbra dates from 1919 and was done by the HUC physician Manuel Marques. The author studied 69 prostitutes who were admitted to the HUC during the month of June 1918.

These women were between 16 and 40 years old, and the majority (N=42) were aged between 18 and 24 years old; 10 were 30 years old or older, and four were under 18 years old (Marques, 1919). Regarding the 67 prostitutes for whom the degree of literacy was established, the author found that only 12 knew how to read and “some only poorly”, thus reaching a degree of illiteracy of 82.1%. Concerning the health condition, 53 of the 69 prostitutes analyzed had syphilis, and for six of them no information was provided respecting the disease. Only 10 were considered as not being infected. The author also made a survey of 13 men treated in the HUC in the same month, and 11 (84.6%) were infected by prostitutes, one suffered from congenital syphilis and the other did not know about the details of the infection (Marques, 1919).

The attempt to determine the socio-economic status, based on income, verified through the analysis of the conditions of admission to the hospital, revealed that 86% of the patients were “poor”, a value much higher than that obtained using

the occupational activity. The first- and second-class pensioners, who, in principle, would correspond to the highest social fringes, represented only 3% of the total number of patients. These results advise the exclusion of this parameter in order to determine the socioeconomic status in the study. In this regard, Cardia (1940: 26) warned of the problem of fraud in the admissions to Portuguese hospitals: "In most of our hospitals, we admit, as poor, people who present attestations of poverty passed by the parish councils [...]. We put in the same group those who have nothing, the indigents, and people, sometimes without family responsibilities, who earn wages of many hundreds of *escudos*¹ per month".

Regarding the characterization of the disease, it was concluded that, of the 1813 individuals for whom it was possible to differentiate between congenital and acquired syphilis, about 89% corresponded to the second. The distinction between sexes proved not significant for both varieties of the disease. Not surprisingly, the analysis of the variable age at first hospitalization was dependent on the type of syphilis, with a mean age for patients with congenital syphilis (9.99 years) significantly lower than that for those with acquired syphilis (27.34 years). The low percentage of patients infected with congenital syphilis registered in the HUC does not necessarily imply that this form of the disease was uncommon in the population.

The results obtained from the logbooks of the cemetery of Conchada (Lopes, 2014) revealed that about 47% (N=84) of deaths from syphilis occurred in infants (between 0 and 9 years), with a percentage of 78.6% of children deceased outside the hospitals. In addition, late congenital syphilis is characterized by manifestations like those of the tertiary phase of acquired syphilis, which could lead to this being not identified, thereby artificially decreasing the patient count.

It is impossible to know the severity of congenital syphilis in Portugal during the study period. If the number presented here of children that died with syphilis can be considered scary by current standards, this represents only a small part of the reality. Calculations made by Brito (1935) pointed out that, in Portugal, more than 4000 abortions occurred annually in direct consequence of syphilis; more than 8000 children were "killed by the disease" from birth, usually precocious, before the third day of their existence, and, adding the children who died in the first years of life, the author estimated that at least 25000 children died every year with the disease.

About individuals diagnosed with acquired syphilis, most women (69%), and a significant percentage of men (42%), had secondary symptoms, followed by cases with tertiary manifestations, in a number significantly higher in men (41%) than in women (18.5%). Regarding the disease in its primary

¹ The Portuguese currency at the time.

phase, it was detected in 202 (11.5%) men and only in 25 (1.4%) women. Some previous studies (Singh and Romanowski, 1999) have shown that primary syphilis is diagnosed much more often in men than in women, succeeding the inverse for secondary syphilis. One possible explanation is that, in women, the primary lesion is often internal, precluding its detection and consequently the treatment, following the disease its normal course (Singh and Romanowski, 1999). The results showed that age significantly influenced the stage of syphilis. While the cases of primary syphilis decreased gradually throughout adulthood, secondary syphilis, the most frequent one until entering the age group of 40 years, decreased from this age. Tertiary syphilis increased significantly with age, becoming the most abundant group for people older than 40 years old.

The data displayed in the specific literature about temporal spacing between the different phases of syphilis point to a period of 10 to 90 days between the primary and secondary phases (Rodrigo and Silva, 2003; LaFond and Lukehart, 2006) and for a time interval from 1 to 46 years between the secondary and the tertiary phase (Singh and Romanowski, 1999).

The results obtained in the present study, while based on only 36 individuals, indicate an interval between the primary and secondary phases of about 8.5 months for women and 11.5 months for men, with the most frequent value

of 1 year for both. It cannot be excluded the hypothesis of individuals not having gone to the hospital immediately after the first secondary symptoms. However, it is known that the secondary phase usually suffers a spontaneous regression about 3 months after the beginning, so these numbers still seem too disparate. Other possible, and more likely, hypothesis, is that some of these individuals went to the hospital not at the beginning of the second phase, but in periods of recurrence, which was quite frequent in cases whose treatment was done using the Neo-salvarsan (Santos, 1934). Regarding the time elapsed between the secondary and tertiary phases, the average found was 9 years for women and 12 years for men, perfectly within the limits considered normal (Singh and Romanowski, 1999; LaFond and Lukehart, 2006).

As for tertiary lesions, the nervous and vascular systems are the preferential targets, but gummas may appear in any part of the organism (Nassif et al., 1980; Leão et al., 2006). Although syphilitic gummas are the most characteristic lesions of tertiary syphilis, in the studied sample they do not represent or have not been described as the first cause of hospitalization. The most frequent lesions are the non-gummatous of the soft tissues, reaching about 87.5% (n=2015) of the individuals for whom it was possible to determine the type of tertiary lesion. The lesions caused by gummas appear in 2nd place, affecting about 6%

(n=142) of the patients. Cases of malignant syphilis are the main cause of these numbers, with 65.7% (n=358) of the individuals to be carriers of neurosyphilis, cardiovascular or cerebral syphilis, classified as being the origin of non-gummatous lesions of the soft tissues. In the remaining cases (such as pulmonary, liver or muscular syphilis), pathological alterations usually originate in soft tissue gummas (Handsfield et al., 1983; LaFond and Lukehart, 2006). However, as they were not classified in the HUC like gummas lesions, it was decided to respect the nomenclature/classification adopted in the clinical records. Therefore, caution is required in interpreting these results given that, adding the cases that are usually classified as determined by gummatous lesions to those actually identified in the hospital, a value of 39% of gummatous injuries is found as being at the origin of the type of tertiary syphilis, against the 15% that were considered based only on the records. It is not possible to exclude the possibility of errors in diagnosis or, more likely, the non-filling of the records. In fact, the hospital records are generally very incomplete, not being to dismiss the hypothesis of physicians not registering all the information they had about the patient and the disease — causing an underestimation of the real numbers.

The cardiovascular system is also one of the most affected by tertiary syphilis and the various organs that constitute it can undergo profound changes in its

structure and functioning, giving rise to irreparable situations (Carvalho, 1934). Currently, it is believed that cardiovascular changes occur in about 70–80% of patients with untreated syphilis (Jackman and Radolf, 1989; Tong et al., 2006). These numbers are much higher than those obtained in the Oslo studies, where cardiovascular syphilis affected 13.6% of men and 7.6% of women (Gjestland, 1955). Regarding the patients admitted to HUC, the data obtained for cardiovascular syphilis are far from the 70–80% of those proposed by Jackman and Radolf (1989), but close to those in Oslo, with about 9% of the admissions identified as suffering from cardiovascular syphilis. However, it is not to rule out the hypothesis that most of these patients remained unknown. Although in the present study, patients admitted with a diagnosis of cardiovascular diseases were not registered, it is possible to verify that among the individuals from the identified osteological collections who were admitted to the HUC throughout their lives due to syphilis, 30.4% (n=17) died from cardiovascular disease. Although it is not possible to affirm that the causes of death were a direct consequence of syphilis, it may indicate that some of the diagnoses of cardiovascular syphilis were not performed.

But perhaps the most feared consequences of late syphilis are the lesions in the nervous system, namely meningo-vascular syphilis and parenchymal neurosyphilis, encompassing the fearful tabes

dorsalis and general paralysis (Carvalho, 1934; Rodrigo and Silva, 2003). In the early twentieth century, the French physician Jean Alfred Fournier (1832–1914) (Rosenow, n.d.) found that, in 5762 cases of syphilis, 1851 presented alterations of the nervous system (Vianna, 1919). Among these, the brain was the most attacked organ: 758 of cerebral syphilis, 86 of general paralysis, 628 of tabes, 136 of medullary syphilis, and 110 of ocular paralysis (Vianna, 1919). This author, who presented results obtained from the study of the entrance records in the services of the Brazilian National Hospital of “Alienados” (mentally ill) between 1905 and 1914, found that in the first 5 years were admitted 4922 patients, of which 38 (0.8%) were diagnosed with neurological syphilis. In the following period, between 1910 and 1914, 6553 patients were admitted, including 275 (4.2%) with the same condition. Vianna attributed this disparity of values to the introduction and development of more reliable diagnostic techniques, such as the Wassermann test. Of the 313 patients diagnosed with neurological tertiary syphilis 236 (75.4%) were men and 77 (24.6%) were women. Regarding the age, Vianna (1919) found that, up to 25 years old, cerebral syphilis is less common (reaching 13% of the affected) and that from that age onwards it becomes more frequent, reaching the highest prevalence in the age group between 36 and 40 years (16.5%). Above 50 years old, the percentage of these pa-

tients falls progressively. Gjestland (1955) had already obtained a total of 9.4% of men and 5.0% of women that developed neurosyphilis. The values in the present study, for all patients, approach those referenced by Vianna (1919), with 4.4% of cases of neurological syphilis, of which 80.8% were in man and 19.2% in women.

The classification of the patients’ status after being discharged from the HUC revealed that 72% of the individuals were discharged with the mention of “improved” or “cured of manifestations”. This finding increased considerably in later years, revealing a greater perception, by the clinicians, of the chronic nature of the disease, not fully treatable by the therapeutic formulas existing at the time. Despite that the medical knowledge included syphilis in the category of chronic and incurable conditions (Lemos, 1937), there were however 20.1% of patients who were discharged with the indication of “cured”. These results, with more patients in later years being discharged as “improved” or “in the same state” in relation to “cured”, seem to point to an increasing knowledge of syphilis and the state of the patients in relation to the disease throughout the study period and does not seem to reflect real differences in health, since the only unequivocal state of diagnosis, that of “deceased”, is affected only marginally by the year of hospitalization.

Few patients died in the HUC with syphilis as the cause of death, compris-

ing only 1.7% (N=117) of all hospitalizations, mainly victims of malignant syphilis. Gjestland (1955) demonstrated that the odds of dying with complications of untreated syphilis were 17% in men and 8% in women, values substantially higher than the 1.7% mentioned above. Once again, it is not possible to exclude the hypothesis of the cause of death recorded not mentioning syphilis, although it was a consequence of the disease, which is why these values may be underestimated.

Conclusions

The late 19th and early 20th centuries saw great progress in the war against diseases — the improvement of sanitation systems and the supply of drinking water allowed the large decrease of diseases such as cholera or typhus. The emergence of more and more specialized hospitals has allowed better control of infectious diseases, while vaccination was increasingly entering people's lives (Hall, 1998). However, none of these improvements were able to prevent the increase of one of the diseases that most terrorized the populations. Syphilis continued relentlessly on its journey through the early years of the twentieth century, only to be stopped when, at the end of the 1940s, an effective cure was finally achieved.

At the outset of this paper, three main objectives were set out on which it was proposed to base all the research work that has now been completed,

which, it should be noted, have been widely achieved. Not only the knowledge of syphilis and its importance in the city of Coimbra from the beginning of the 20th century is now much larger and more reliable, as it was possible to characterize the people who suffered from the disease. This work would not have been possible without the use of the unique archival estate on the HUC, and thus highlighting the importance of archival records for the work of the paleopathologist. In fact, it is considered that much remains to be done in this field and that this work is essential for the knowledge of the diseases of the past, which can become the diseases of the future.

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