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THEMATIC COLLECTION: STANDARDS & THEIR CONTAINERS ORIGINAL RESEARCH ARTICLE

On Medical Standardisation in Times of Scientific Uncertainty: The Management of Flu Epidemics by the French Military Medical Service After the World Pandemic (1920s–30s)

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Abstract

Using the example of anti-influenza struggle during the 1920s and 1930s, this article asks how the French armed forces health service developed and implemented standardised medical and prophylactic management to face it in times of uncertainty about the nature of the pathogen. The notion of standardisation is placed at the center of the analysis inquiring how exogeneous as endogenous knowledge, norms and practices combined to design the most robust prophylactic and therapeutic strategies possible and their limits. Standardisation is presented as a process of continuous improvement where progressive rationalization of prophylactic measures widely inspired by the Pasteurian school and the improvements in the medical management of influenza patients in a context of therapeutic trial and error required regular changes to standardisation. The article highlights how the proximity between military and civilian actors involved in the production of norms and standards enables us to observe a gradual alignment between medical theories, laboratory research, bedside clinics, preventive measures and treatments used with technical, bureaucratic and organizational systems for the benefit of public health policy.

Keywords

influenza; interwar period; prophylaxy; French armies; therapeutics; standardisation

Introduction

Based on a detailed examination of the French army medical service (archives based in Vincennes), this article explores how the French armed forces health service progressively developed and implemented standardised medical and prophylactic management of influenza risk during the inter-war period. The strategy is designed in three complementary stages: detect, isolate, monitor. It examines how this happened in three contexts: the transformation of the pandemic into seasonal epidemics, the realignment of a medical service within an army that was itself in the midst of reconstruction, and scientific uncertainty as to the microbiological nature of the agent of influenza.

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This standardisation process was primarily the product of the organisational and functional logic of the health service itself, but it was also the result of importing norms and standards from outside the military, which helped to shape its influenza strategy. It is based first and foremost on the production and mobilization of knowledge, which is the subject of a dynamic of regulation within heterogeneous socio-technical networks (medical, scientific, industrial and public-sector players) (Vinck and Weisz 2007). It is based on the implementation of stabilized operations, procedures, materials, techniques and administration methods (Bonah 2009). In the medical field, and particularly in microbiology and infectious diseases, the growing body of knowledge confirms that 'the linear model of innovation is particularly unsuitable' (Löwy 2010). As far as possible, it's a question of overcoming a complex set of obstacles that combine the weight of institutional structures with the intellectual, material and technical conditions of the given moment (Rey 1994).

Both vectors and victims of epidemic diseases, armies are often called upon to intervene or act in contexts of degraded health environments (Smallman-Raynor and Cliff 2006). The Spanish flu pandemic, in which disease was spread as much as it was fought by the armies at the end of the First World War, is no exception (Humphries 2014). Its eruption of the 1918 defeated all available mechanisms in France that could be mobilized to fight against disease (Viet 2015). Several public health measures and attempts to prevent further outbreaks were implemented in France, just as was the case in the rest of the world (Smallman-Raynor and Cliff 2006). Historian of medicine Anne Rasmussen has shown how, for those fighting, the issue of public health became 'a categorical imperative' during the war (Rasmussen 2016). It took shape through the development of military medicine and sanitation in order to 'prevent the emergence of infectious diseases and to also stop their spread' (Rasmussen 2004). The imperative of health was even more compelling as, in the case of the Spanish Flu and seasonal epidemics of influenza that followed it during the interwar period,

> . . . bacteriology, faced by the unknown infectious agent of influenza, would show itself deprived of those reassuring and unequivocal explanations born of the Pasteurian revolution, capable of linking a pathology to an underlying germ while identifying the therapeutic solution through a vaccine or serum (ibid.).

This context of intrinsic hesitation in Pasteurian thinking reinforced the difficulty of bringing public health measures with a high level of confidence (Carvais 1986).

Furthermore, the omnipotence of Pasteurian bacteriology was being challenged by the progress of environmental epidemiology and the proposal of new multifactorial statistical models (Mendelsohn 1998). In other words, the Spanish flu epidemic shook the certainties of the national schools of bacteriology and challenged the military doctors who had prided themselves on having contained the impact of epidemics on the armies during the outbreak (Berger 2009). The end of the First World War was also marked by 'the return of social medicine more broadly after 1918 with preventive medicine at the heart of socialist governments in Weimar Germany, Eastern Europe, Scandinavia etc., as well as within the League of Nations' (Weindling 1986; Porter 1999). France was no exception (Murard and Zylberman 2003).

In the interwar period, this health imperative asserted itself on a military medical service that returned to a reduced format after 'a drastic programme of cuts that deprived it of any ambitious plans' (Viet 2015). This same service, which ended the world war physically exhausted and scarred by the test of the

pandemic (Bruyère-Ostells and Pouget 2020), then had to adapt to the risk of influenza that was becoming seasonal (Vagneron 2015a). Even if the more often the virus produced essentially sporadic localized outbreaks, influenza in the 1920s and '30s was still seen by the army medical service as a potentially massive epidemic risk: it could immobilize troops and quickly overwhelm military hospitals that worked with a bare minimum of human and material resources.

Influenza and Military Public Health (1920s and '30s)

The interwar period was marked by the establishment of influenza (that of mutant viruses from the H1N1 strain) as a seasonal disease (Taubenberger and Morens 2006). Its virulence, however, seemed relatively weakened. Compared to the devastation of 1918 and '19, mortality levels in France stabilized (up to the 1960s) within a range of between 10,000 and 20,000 deaths per year (Meslé 2010). Historian Jacqueline Delouge has analysed this influenza-like illness mutation with regard to the Nord department in France (Devouge 1974). She highlights a certain number of characteristics that seem to be valid for the entire period: the variability of severity depending on the episodes (she distinguished those of 1927, '29, '31, '33 and '35), the consequent variability of mortality, and the vulnerability of young children and the elderly. Urbanization and the concentration of populations in cities were considered to be aggravating factors of contagion.

However, the overall trend for the period was towards a reduction in deaths from epidemic diseases, which came to affect only a small fraction of the population. The health crisis caused by the Spanish flu led to a political and parliamentary debate that ended in 1920 in the creation of the first Ministry of Health, which set out to develop a hospital system throughout the country and to support the growth of city medicine (Tabuteau 2007). Influenza has long been identified as a public health risk. However, France did not define a prevention policy specifically targeting it during the interwar period (Tabuteau 2015). Moreover, neither the decree of the 10th of February 1903, nor those that followed it (i.e., 30th October 1935, 16th May 1936 and 21st December 1936) included influenza in the category of diseases with a reporting obligation to the public health authorities (Antoniotti et al. 2002). An international system of surveillance would not be established until after the Second World War (Aranzazu 2013; Vagneron 2020).

Winter epidemics therefore followed one another, while the world was waiting for a new pandemic and the devastation everyone knew would accompany it. The military health service was to manage the common flu while preparing to cope with a predicted epidemic emergency (Ministère de la Guerre 1932). In military regions, the troops – mostly conscripts – were therefore exposed to the same influenza epidemics as the civilian populations. As an example, the Parisian military region was affected by the disease between the beginning of January and the first weeks of March 1933. Out of a total force of 57,746 men, there were 1,136 sick and 11 dead for the entire episode (FMA1).

Furthermore, the question arises as to whether there was an excess of influenza-related mortality in the military compared to the total population. For the central directorate of the armed forces health service the answer was clearly no:

> It should also be noted that, while slightly higher than in previous years, influenza-related mortality for the year [1935] should not be considered as exceptionally abnormal; it is even lower than in 1929 and 1931; it is also lower than that observed in the civilian population for young people aged 20 to 24. (FMA 2).

This gap in the situation of soldiers' health conditions compared with the rest of population should be correlated with continued medical efforts to research therapeutic solutions that would improve the prognosis of patients suffering from influenza.

The Unfinished Standardisation of Anti-Influenza Therapy

During this time, the scientific community was struggling to identify the pathogen involved in the 'Spanish Flu' (Tognotti 2003). The scientific discussion provided two opposing visions of influenza:

> . . . for some, the disease was the manifestation sometimes benign, sometimes severe, of already known microbes [. . .] for others, it was a new morbid entity, determined by a 'special factor as yet unknown' (Rasmussen 2007, 181).

These disagreements moved beyond the sole question of etiology, but also related to the modes of contagion, the geographical origin of the disease, and its treatments. The controversy arose as much from intellectual disagreements as from competition between distinct institutions. From a therapeutic point of view therefore, the army doctors still made use of treatments developed during the 'Spanish influenza' pandemic without the emergence of normative recommendations.

However, the military health service took part in clinical investigations, with its members publishing on the proven or supposed efficacy of treatments implemented in the field (Vagneron 2015b). As early as 1919, the *Revue générale de clinique et de thérapeutique, le journal des praticiens* published an article by the second-class medical officer Fauvet on influenza prophylaxis using quinine (1919, 38–9). Its antimalarial use in colonial troops had been widespread for a long time (Fredj 2016). In particular, quinine was widely distributed as a preventive measure (Monnais-Rousselot 2007). Fauvet noted that 'people with malaria on occasion of an influenza epidemic were not affected'. He argued that these results were probably due to the fact 'that their body was saturated with quinine'. He called for a further clinical investigation to be initiated to confirm or deny 'the value of quinine in the prophylaxis of influenza'. However, these recommendations were not adopted by the army medical service.

More broadly, the efforts of scientists from all nations to develop an effective influenza vaccine were important throughout the interwar period (Kirchhelle 2019; Bresalier 2013). However, this work progressed slowly in the 1920s because the nature of the pathogen involved in influenza was still unknown (Eyler 2009). In the inter-war period, which was characterised by an important and growing international research dynamic (Schwartz 2018; Löwy 2005), Emile Roux (head of the Pasteur Institute) therefore urged great caution as early as 1918 regarding the possibility of having a preventive vaccine in the short term (Bar-Hen and Zylberman 2015).

Curative vaccines, for their part, were developed very early on (1918–1919), in particular by the Pasteur Institute in order to act in cases of bacterial superinfection (FMA 3). Lipovacins (fat-dissolved) anti-streptococcus or pneumococcus were therefore used frequently as they demonstrated 'the importance of secondary bacterial pneumonias' (Shanks 2014). Anti-pneumococcus serums were therefore generally used in subcutaneous injections of 40 cubic centimeters (FMA 4). As a result, the 'G vaccine' was prepared from 1919 and 'contains bacteria most often isolated from pulmonary complications' (FMA 3). It was prepared from a mixture of four bacteriological emulsions: streptococcus, pneumococcus, the influenza (Pfeiffer)

bacillus, and micrococcus aureus. The development and manufacture of the 'G vaccine' complied with the normative and standardised framework of scientific work as conducted within the Institut Pasteur; this framework must guarantee, if not the effectiveness, at least the safety of the product.

The Institut Pasteur also proposed a potential standardisation of the use of the G vaccine according to a pre-established protocol of use (see table 1).

Table 1. 'G vaccine' Implementation Protocol from the *Institut Pasteur*, 1919.

THERAPEUTIC INDICATION	Preventive action	Curative action (Days 1 and 2)	Curative action (Day 3 and after)
SEROTHERAPY PROTOCOL	1–2 cc - 1 injection	12 - cc –1 injection + daily inoculation (3 days) **Day 1** Anti-pneumococcal, anti-Pfeiffer, anti-streptococcal serum **Day 2** Anti-Pfeiffer, anti-streptococcal serum **Day 3** Anti-streptococcal serum	Daily inoculation with gradually increasing doses Injections suspended when the temperature drops. (¼ cc rise with each new injection)

An expert meeting involving members of the army health service, hospital doctors and doctors and researchers from the Pasteur Institute was held in Paris on 28th October 1918 (FMA 5), which discussed whether 'there are grounds for the current application in the military of preventive bacteriology of certain complications of influenza', i.e. to deploy the 'G vaccine'. The main question was whether the proposed method of bacteriotherapy was indeed safe. The discussion began with an information point on the state of knowledge. There was repeated mention of Eyre's work (implicating streptococci) and Rosenow's work on the pneumococcal vaccine trials in the United States. The inclusion of anti-Pfeiffer serum in the composition of the 'G vaccine' was not a surprise. For example, the results of 'Doctors Antoine and Orliconi' who noted 'in a certain number of patients the presence of Pfeiffer's bacillus both in the blood and in the pleural fluid' were presented to the Academy of Medicine during the session of Saturday the 10th of September 1918 (FMA 6). However, this observation did not meet with consensus in the scientific community: Hugo Selter published results at the end of August 1918 showing that he had not found Pfeiffer's bacilli in any of the 33 cases he had studied, either by microscopic examination of the smears or by culture (Selter 1918). The Pasteur Institute has therefore been asked to shed light on this issue. Their results were communicated by

René Legroux in January 1919: Pfeiffer's bacillus has been 'found in a number of cases of [Spanish] influenza and is usually not isolated but linked to other bacteria such as streptococcus and pneumococcus' (FMA 42). In the end, no standardised treatment approach was really decided.

The 1920s saw this research pursued through the development of a vaccine adapted to the treatment of microbial infections secondary to influenza (Lamy 1929). The results obtained were not sufficiently conclusive to allow widespread use of the vaccine, although in some cases it appears to have reduced complications and lowered mortality (FMA 7). In the 1930s, the consolidation of knowledge and experience with diseases led to a re-evaluation of the effectiveness of vaccine and serotherapy. For example, a study was conducted in May 1935 (FMA 43) using a 'comparative' method based on 150 observations (It concluded that 'based solely on the clinical cases [. . .] observed [we can be] led to believe that pneumococcal and anti-streptococcal vaccine and serotherapy can be a useful adjunct to conventional treatment of influenza complications' (FMA9)).

By the end, French military medicine envisaged a plurality of therapeutic solutions while waiting for medical research to accomplish significant progress. The case of the soldier Pierre Evain illustrates the empirical character of the army's medical strategy in combatting severe forms of influenza throughout this period of trial and error. Pierre Evain was part of the 6th regiment of engineers (Angers) and died during the winter of 1933 'from influenza complicated by pleurisy' (FMA 10). Upon his arrival at the hospital, he presented classic clinical symptoms: 'feverish state, pharyngitis, cough, sputum observed, symptoms of bronch-pneumonia of the lower left with dull percussion across the span of two hands, fine crackles and rough breathing at the level of the tip of the left scapular' (FMA 11). He first received treatment combining injections of the Weill-Dufourt vaccine subcutaneously as well as septicemine intravenously (VDPS 1920).[1] The treatment was completed with 'cold wraps' [to lower the temperature] and cardiotonics (digitaline) (FMA 11). The use of the Weill-Dufourt vaccine inscribed itself into the logic of using vaccines as therapeutics to treat the secondary bacterial infection. (Hardy 2000; Matthews 2002; Picard 1927). It was composed of pneumococcal enterococci, staphylococci, and tetramer. It is used as a preventative against bronchitis and bronchopneumonia and curative for pneumoniae and bronchopneumonia (VDPS 1920). Even with this treatment, the health of Pierre Evain rapidly deteriorated. Five days after the start of treatment, he presented a liquid syndrome which justified an exploratory puncture/drain in his lungs (FMA11). The 'deep yellow liquid' that was collected was shown through bacteriological analysis to be a mixture of blood, leukocytes, and lymphocytes 65 per cent but with no sign of suppuration (ibid.). The next day, with no sign of improvement, a new puncture was created. Under the treatment plan the patient received an intrapleural

[1] The Weill-Dufourt vaccine is composed of pneumococci, enterococci, staphylococci, tetragens. It was first indicated for the treatment of bronchopneumonia and pneumonia in children before its use was extended to adults (VDPS 1920, 1598).

injection of electrargol,[2] and a phlebotomy (ibid.). Finally, a fixation abscess was tried. This practice, developed towards the end of the nineteenth century, consists in general of a subcutaneous injection of a cubic centimetre of turpentine (Carles 1903). Alongside this, artificial suppuration was implemented for pneumonia or bronchopneumonia. Seven days after the start of his hospitalization, the condition of Pierre Evain continued to degrade. His physicians recorded a body temperature of 40 degrees Celsius and a 'running' pulse of 130 beats a minute. He also presented a congested syndrome in the lower right, associated with a 'slight delirium' and carphology (frenetic and uncontrollable movements of the hands) (VDPS 1920). The next day, the decline of his health accelerated. A new pleural puncture produced a purulent liquid in which the cytobacteriological analysis showed the presence of leukocyte pus with several pneumococci (ibid.). Pierre Evain therefore entered the terminal phase of his agony, which saw him suffer through succeeding phases of dyspnoea and cyanosis, and then a coma before death finally intervened (ibid.).

The treatment implemented at Pierre Evain's bedside corresponds more or less to the standard of therapy used in military hospitals and infirmaries in the 1930s. It was based on a combination of vaccine therapy (Minet and Weill-Dufourt pneumonic vaccines), serotherapy (Vincent antistreptococcal serum) and drug treatments (urotropine, septicemine and electrargol) (FMA 12, FMA 13). The analysis of the sources seems to document a proto-standardisation of the medical care of influenza patients within the armed forces. The central directorate of the health service centralises the reports of its doctors and sends general recommendations of good practice down to hospitals. In addition, it implements inspections whose aim is as much to gather information as to verify a community of practice (FMA 14). These inspections corresponded to the way the health service had been organised and operated since the nineteenth century (Pouget 2020). They resulted in a constant adjustment of the influenza management strategy, a strategy that combines emergency measures but also had to be implemented in the long term (FMA 15).

However, the care and treatment of the soldier Evain notably demonstrates the limits of the effectiveness of vaccines, and more generally the ineffectiveness of medical treatment for serious cases before the appearance of sulphonamides, which from the second half of the 1930s would allow the treatment of significant infections such as pneumococcus and streptococcus. (Bourdelais 2009). In the face of disease, military doctors and executives of the army health service ultimately refused throughout the period to offer a single therapeutic route: 'the treating physician is, of course, absolutely free in the conduct of his medical therapy of which he is the only judge' (Rasmussen 2007). The standardisation of treatment is more advanced when the therapies are more proven, as for example in the case of typhoid fever with the vaccine developed by Hyacinthe Vincent (Rasmussen 2008). Therefore, in this phase of therapeutic uncertainty, the standardisation of robust prophylactic measures seems to have been the most immediate solution to contain the spread of influenza.

[2] Electrargol is a small grain colloidal silver electric medication used in all infectious diseases without specificity for the pathogen. Among its indications are purulent pleurisy with a dosage of 20 to 50 cc by intrapleural injection (VDPS 1920, 119).

A Fully Standardised Prophylactic Strategy

Even if the identification of a robust cure seemed far off, prophylactic measures to be implemented during an epidemic were well known (Smallman-Raynor and Cliff 2006). From the first months of the Spanish Flu pandemic, the concentration of the sick in military hospitals could be considered as an aggravating factor in spreading the disease, giving 'birth to a tension, even a dichotomy, between its treatment and its cure' (Viet 2015). Faced with a pathogen whose true nature remained uncertain, the army health service pursued prophylactic measures implemented since 1918 at the end of the conflict (FMA 16). In view of the figures, it is therefore not surprising that the Secretary of State for the health service, Louis Mourier, considered in his instructions dated from 10th October 1918 that the containment of the epidemic was a priority (FMA 17). A circular from the Minister of War dated 8th December 1918 insisted on the need for early detection and from the immediate implementation of the means of prophylaxis (FMA 7). These devices fell under, as Anne Rasmussen writes about the anti-typhoid campaign, 'the prescriptions of a collective and administered medicine' (Rasmussen 2008).

In a context of therapeutic uncertainty, classic public health prevention had been advantageously used; these measures consisted in the application of quarantine rules, confinement, and closures of public places. They were a central element in the containment strategy (Schwarz 2018; Markel et al. 2007). Their effectiveness, which is difficult to measure, seemed to play a role in slowing the spread of the disease. These measures were also regularly reviewed by subsequent circulars (FMA 18 and FMA 19). They applied to all areas of collective living and care such as barracks, as infirmaries and hospitals. They were interested in the control of military movements since they imposed medical examinations as soon as recruits are received, as well as on the departure and return of those on leave (FMA 7).

These measures were detailed in the letter of 6th January 1933 from the Minister of War to the general commanders of the military regions, which set out in detail the procedures for managing cases and contexts of influenza (FMA 20). These instructions were confirmed in 1935 (FMA21). The care process began with a systematic clinical screening of patients in the barracks. Management, if necessary, continued in the infirmary with a complete medical examination. Depending on the severity of his condition, the patient was referred either to an isolation room (mild case), or admitted to the infirmary, and, in the most serious cases, hospitalized. Obviously, prophylactic measures are implemented from the infirmary (isolation of the flu). The escalation of cases was almost immediate in reports sent every three days to the director of the Health Service (FMA 8). These documents gave summaries of the patient's history, the date of onset of the disease (first presentation of the patient and medical examination), the patient's curriculum since the date of the first presentation, and a summary of the patient's observation at the hospital, with transmission of the temperature sheets and other laboratory examinations.

The implementation of these collective prophylaxis measures was inseparable from the use of 'barrier' materials to prevent the spread of the disease. Caregivers in contact with patients were required to wear 'special coats' (FMA 7). The use of the paper mouth coverings had been known for a long time, and not only to OR surgeons (Lynteris 2018). Use of masks had been defended since 1918 by the physicians Defressine and Violle who, through the application of their observations of influenza at Toulon, advocated 'a mask made from a rectangle of gauze folded in four layers and held with the help of strings' (FMA 22). The Inspector General Hyacinthe Vincent presented for its part two tarlatan (muslin fabric) masks models to the Academy

of Medicine in 1918 (FMA 23).[3] He insisted on the obligation to wear a mask for caregivers in an epidemic. They should consist of a minimum of six tarlatan sheets stacked on top of each other to trap germs (ibid.). After the war, masks continued to be used by members of the health service and their patients (FMA7, FMA 24). Stocks were filled either by central stores or by orders from industry or were made on site by hospital staff. Local offers were solicited 'to make on site by civil manpower the necessary mouth coverings' (FMA 25). In the end the price of a mouth covering oscillated between 0,038 French francs (FF) (made by the Bayonne military hospital) and 0,06 FF (Bordeaux military hospital) (FMA 26). For example, for the year 1926, the provision of 150,000 paper masks (of doubtful efficiency and based on simple technology – folded paper) was planned, i.e. one mask for every four soldiers (the army had 624,000 men in 1925) (FMA 27). The interest of the medical service in the development and manufacture of protective masks continued throughout the period. Their use was particularly recommended in sites and spaces of health care: 'a mouth covering would be particularly useful for men who present an incoercible cough who need to be isolated in the waiting rooms [of clinics]' (FMA 28). Experimentation was thus pursued throughout the interwar period in order to improve these personal protection devices. This consisted in implementing 'all useful modifications of existing models' or of proposing new models, since 'previous models do not appear to have been satisfactory' (FMA 29).

Thus, a commission was specifically charged with 'examining the material and objects to be preserved as models' (FMA 30). As a result, the technical department of the army medical service tested, from the start of the 1930s, 'models of masks that protected against infectious diseases (glasses with clips or snap fasteners and flaps of different types)' (FMA 29). In effect, 'the glasses and protective masks that were adapted presented inconveniences that rendered them of little practical value, if not entirely impractical' (FMA 31). These masks were composed of glasses on which were fixed – through the method of stainless-steel snap fasteners (FMA32) – flaps made from medical gauze, from waterproof medical cloth, or even from waterproof cloth under-sheets (FMA 33). Nothing was wasted within the army; as a result, stocks of white flannel were mobilised to create flaps with 'protective glasses against infectious diseases' (FMA 34).

In addition to the search for a French solution for masks, the military health service was attentive to what their foreign counterparts are doing. The French were particularly interested in the prophylactic practices of the Japanese army, in which the use of masks had been generalised since January 1921 (FMA 35). The French Embassy in Tokyo therefore sent 11 samples to the Health Service from the Japanese Health Service Directorate in 1929, accompanied by a detailed report on the Japanese experience (FMA 36).

These personal protective tools were not panaceas. This was because, first, their fabrication required equipping an entire army for extensive preventative use, and thus the development of a new industrial sector. Second, their true efficacy was an unknown. The principle of generalising its use was, moreover, ruled out several times by the French Health Service regularly throughout the 1930s (FMA 37).

[3] Tarlatan is a very loosely woven and very finished cotton fabric.

The decision was always justified by the fact that there was no certainty that 'the measure prescribed would be effective and that the execution of the order itself can be assured in all cases' (FMA 38).

Individual prophylactic measures did not guarantee complete protection, therefore, it appeared essential to all to develop the capacity to rapidly identify new cases and disease outbreaks. At the intersection between issues related to prophylaxis and medical issues, the detection of influenza cases particularly mobilized the military medical service which stressed the importance of implementing an 'early bacteriological diagnosis'. Indeed, the latter had a solid network of laboratories, in addition to those which were deployed as close as possible to the armies during the war (Régnier 2004). These laboratories carried out a wide variety of investigations (biological, food, water), and were supported by military hospitals (Viet 2015). After the First World War, each military region was fitted with a central laboratory. For example, in the district of the First military region (the north of France) the laboratory at Lille conducted the examinations and analyses 'for the military hospitals of Lille, Calais, Cambrai, Dunkerque and Maubeuge' (ibid.). Biological analysis capacities were less consolidated in secondary cities and colonies, with the exception of large cities due to the presence of Pasteur Institutes as in Algiers or Tunis (Léonard 1981). These analyses were a link in the chain of screening for epidemic diseases (Reiser 1978). Activity could be significant. In 1933, the laboratory of the Hospital for Instruction of the armies of Val de Grâce carried out 5,259 biological analyses out of a total of 6,437 (FMA 39). For the year 1933 alone, of the 2,628 analyses conducted by Lille's military hospital, 2,176 were biological analyses, of which 292 were of blood, 1,872 urine, 9 stool, and 2 cerebrospinal fluid (FMA 40).

Bacteriology played a significant role in confirming or refuting clinical diagnoses of influenza. For example, between the 1st of January and the 29th of June 1936, there were 120 bacteriological analyses out of 328 at Talence military hospital (FMA 41). These diagnostic capacities were not part of the search for a still unknown influenza virus, but rather for the detection of bacteria responsible for secondary infections (pneumococci, staphylococci, meningococci). This mobilization of the armed forces' bacteriological capacity for detection purposes needs to be understood in relation of the army's participation in the broader French effort to research the nature and etiology of the pathogenic agent of influenza. In effect, in France the National Medicine Academy, le Val-de-Grâce (Military Medical School), and the Pasteur Institutes were the principal protagonists in the controversies that followed (Rasmussen 2004).[4]

In a period of intense scientific effort to identify the pathogen responsible for influenza, bacteriology therefore played a useful role in identifying indirect signs of infection. The development of military capabilities to carry out these analyses in its own laboratories attests to – beyond interactions with civil actors such as the Pasteur Institutes – the gradual systematisation of the use of biological analyses, which were part of the non-linear process of standardisation of medicine (Löwy 2007).

[4] In the British case, the collaboration between civil and military medicine was decisive in allowing the identification of the virus during the 1920s, see e.g. Bresalier 2012.

Conclusion

In the interwar period, the viral agent responsible for the disease remained unidentified, as its etiology and modes of spread were poorly understood. Medical and health action rested first of all – with a lack of vaccine or robust therapies – on the deployment of prophylactic measures which can be summed up by the formula: detect, isolate, monitor. The medical doctrine of the army in the management of the risk of influenza – as all epidemic risks continue to be – was largely subject to Pasteurian precepts and its practices. Indeed, the military medicine was powerfully involved in the process of pasteurisation of public health (Latour 1988). To rephrase Bruno Latour's expression, Pasteurian physicians 'legislate' since 'the Pasteurian works both in the laboratory and on administrative regulations'(Latour [2001] 2011).

This article demonstrates the capacity for standardisation of medical and health responses to the flu epidemic threat when it became seasonal in the French army of the 1920s and '30s. This standardisation process articulates both endogenous and exogenous logics and dynamics in the military health service. This process is based first on the implementation of medical progress, which was reflected in the continuous interactions between the armed forces health service, the world of experts and, more generally, the international medical community. The progressive standardisation of the fight against influenza also relied on the functional and organisational capacities of the health service, whose professional culture consisted in producing norms and standardising processes and practices. The apprehension of influenza risk was a non-linear and non-uniform process. The uncertainties concerning the nature of the pathogen, and the limited effectiveness of the available therapies explain the department's difficulties in systematising the medical management of diseases. The long-standing experience in the non-medicinal management of epidemics, combined with advances in protective devices and hygiene, certainly explain why the military health service could implement a more consolidated standardisation of flu prophylaxis. In the end, an influenza vaccine became available to doctors only at the end of World War II (Smallman-Raynor and Cliff 2006). Its use, combined with the arrival of new antibiotics from the 1950s onwards, helped to mitigate the effects of influenza on the health of both soldiers and the civilian population (Chauveau 2002).

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References

Antoniotti, Stéphanie, Sylvain, Vincent Pellissier, Marie-Claude Siméoni, and Carlos Manuel. 2002. "Déclaration obligatoire des maladies infectieuses: Des maladies 'pestilentielles' aux maladies 'émergentes'" [Mandatory Reporting of Infectious Diseases: From 'Pestilential Diseases to 'Emerging' Diseases]. *Santé Publique* [Public Health] 14(2): 165–178. https://doi.org/10.3917/spub.022.0165.

Aranzazu, Ana. 2013. "Le réseau mondial de surveillance de la grippe de l'OMS: Modalités de circulation des souches virales, des savoirs et des techniques, 1947–2007" [The WHO Influenza Surveillance Network: Modes of Circulation of Virus Strains, Knowledge, and Technologies, 1947-2007] *Sciences sociales et santé* [Social Sciences and Health]. 31(4): 41–64. https://doi.org/10.3917/sss.314.0041.

Bar-Hen, Avner, and Patrick Zylberman. 2015. "La presse parisienne et la grippe 'espagnole' (1918–1920)" [The Parisian Press and 'Spanish' Flu (1918–1920)]. *Les Tribunes de la santé* [Health Tribunes] 47(2): 35–49. https://doi.org/10.3917/seve.047.0035.

Berger, Silvia. 2009. *Bakterien in Krieg und Frieden: Eine Geschichte der medizinischen Bakteriologie in Deutschland, 1890–1933*. [Bacteria in War and Peace: A History of Medical Bacteriology in Germany, 1890-1933]. Göttingen. Wallstein Verlag.

Bonah, Christian. 2009. "Packaging BCG: Standardizing an Anti-Tuberculosis Vaccine in Interwar Europe." *Science in Context* 21(2): 279–310. https://doi.org/10.1017/S0269889708001725.

Bourdelais, Patrice. 2009. "Le contrôle des grandes crises épidémiques" [Control of Major Epidemic Crises]. *Les Tribunes de la santé* [Health Tribunes] 22(1): 41–51. https://doi.org/10.3917/seve.022.0041.

Bresalier, Michael. 2012. "Uses of a Pandemic: Forging the Identities of Influenza and Virus Research in Interwar Britain." *Social History of Medicine* 25(2): 400–24. https://doi.org/10.1093/shm/hkr162.

———. 2013. "Fighting Flu: Military Pathology, Vaccines, and the Conflicted Identity of the 1918–19 Pandemic in Britain." *Journal of the History of Medicine and Allied Sciences* 68(1): 87–128. https://doi.org/10.1093/jhmas/jrr041.

Bruyère-Ostells, Walter, and Benoît Pouget. 2020. "Le 'prix' médical de la Première Guerre mondiale: Réparations de guerre, Service de santé des armées et contextes épidémiques" [The medical 'price' of the First World War. War reparations, the Army Medical Corps and epidemic contexts]. *Revue du Rhin supérieur* [Journal of the Upper Rhine] 2: 35–52. https://doi.org/10.57086/rrs.134.

Carles, Jacques. [1903] *Les abcès de fixation dans les maladies infectieuses et les intoxications* [Fixation Abscesses in Infectious Diseases and Poisonings]. Paris: Baillière & Fils.

Carvais, Robert. 1986. "Le microbe et la responsabilité médicale" [The Microbe and Medical Liability] In *Pasteur et la 'révolution pasteurienne'* [Pasteur and the Pasteurian Revolution], edited by Claire Salomon–Bayet. Paris: Payot.

Chauveau, Sophie. 2002. "Médicament et société en France au 20e siècle." *Vingtième Siècle: Revue d'histoire* [Twentieth Century: Journal of History] 73: 169–85. https://doi.org/10.3917/ving.073.0169.

Dictionnaire Vidal des spécialités pharmaceutiques [Vidal Dictionary of Pharmaceutical Specialties], 1920. Paris, Office de vulgarisation pharmaceutique, 119 and 1598.

https://numerabilis.u-paris.fr/medica/bibliotheque-numerique/resultats/index.php?do=chapitre&cote=pharma_p11247x1920.

Devouge, Jacqueline. 1974. "Mortalité et société: Les causes de décès dans le Nord durant l'Entre-deux-guerres" [Mortality and Society: Causes of Death in the North During the Interwar Period]. *Revue du Nord* [Northern Review] 222: 397–410. https://doi.org/10.3406/rnord.1974.3262.

Eyler, John M. 2009. "The Fog of Research: Influenza Vaccine Trials during the 1918–19 Pandemic." *Journal of the History of Medicine and Allied Sciences* 64(4): 401–28. https://doi.org/10.1093/jhmas/jrp013.

Fauvet. 1919. "La quinine dans les prophylaxies de la grippe" [Quinine in Flu Prophylaxis]. *Revue générale de clinique et de thérapeutique* [General Clinical and Therapeutic Review]. January 18, 1919, 38–39. https://numerabilis.u-paris.fr/medica/bibliotheque-numerique/resultats/index.php?do=feuilletage-resultats&cote=91405&dico=perio&chapitre=fauvet&numero-resultat=2.

Fredj, Claire. 2016. "Soigner une colonie naissante: Les médecins de l'armée d'Afrique, les fièvres et la quinine, 1830–1870" [Curing a Nascent Colony: African Army Doctors, Fevers and Quinine, 1830–1870]. *Le Mouvement Social* [The Social Movement] 257: 21–45. https://doi.org/10.3917/lms.257.0021.

Hardy, Anne. 2000. "'Straight Back to Barbarism': Antityphoid Inoculation and the Great War, 1914." *Bulletin of the History of Medicine* 74(2): 265–90. https://doi.org/10.1353/bhm.2000.0073.

Humphries, Mark Osborne. 2014. "Paths of Infection: The First World War and the Origins of the 1918 Influenza Pandemic." *War in History* 21(1): 55–81. https://doi.org/10.1177/0968344513504525.

Kirchhelle, Claas. 2019. "The Forgotten Typers: The Rise and Fall of Weimar Bacteriophage-typing (1921–1935)." *Notes and Records: The Royal Society Journal of the History of Science* 74(4): 539–65. http://doi.org/10.1098/rsnr.2019.0020.

Lamy, Jean-Joseph. 1929. *Grippe et lipovaccin*. [Flu and Lipovaccine]. Doctoral Thesis. Bordeaux: Imprimerie de l'Académie et des Facultés.

Latour, Bruno. 1988. *The Pasteurization of France*. Translated by Alan Sheridan and John Law. Cambridge, MA: Harvard University Press.

———. [2001] 2011. *Pasteur: Guerre et paix des microbes* [Pasteur: War and Peace of Microbes]. Paris: La Découverte.

Léonard, Jacques. 1981. *La médecine entre les savoirs et les pouvoirs: Histoire intellectuelle et politique de la médecine française au XIXe siècle* [Medicine between Powers and Knowledge: Intellectual and Political History of French Medicine in the 19th Century]. Paris: Aubier.

Löwy, Ilana. 2005. "Biotherapies of Chronic Diseases in the Inter-war Period: From Witte's Peptone to Penicillium Extract." *Studies in History and Philosophy of Biological and Biomedical Sciences* 36(4): 675–95. https://doi.org/10.1016/j.shpsc.2005.09.002.

———. 2007. "Conclusion. Notes sur standardisation et régulation de la médecine" [Conclusion. Notes on Standardization and Regulation of Medicine]. In *La gouvernance des innovations médicales* [The Governance of Medical Innovations], edited by Virginie Tournay, 303–24. Paris; Presses Universitaires de France. http://doi.org/10.3917/puf.tourn.2007.01.0303.

———. 2010. "Cultures de bactériologie en France, 1880–1900: La paillasse et la politique" [Bacteriology Cultures in France, 1880–1900: The Bench and Politics]. *Gesnerus* 67(2): 188–216. https://doi.org/10.1163/22977953-06702002.

Lynteris, Christos. 2018. "Plague Masks: The Visual Emergence of Anti-epidemic Personal Protection Equipment." *Medical Anthropology* 37(6): 442–57. https://doi.org/10.1080/01459740.2017.1423072.

Markel, Howard, Harvey B. Lipman, J. Alexander Navarro, Alexandra Sloan, et. al. 2007. "Nonpharmaceutical Interventions Implemented by US Cities During the 1918–1919 Influenza Pandemic." *Journal of the American Medical Association* 298(6): 644–54. https://doi.org/10.1001/jama.298.6.644.

Matthews, J. Rosser. 2002. "Almroth Wright, Vaccine Therapy, and British Biometrics: Disciplinary Expertise versus Statistical Objectivity." In *The Road to Medical Statistics*, edited by Eileen Magnello and Anne Hardy, 125–47. Leiden: Brill. https://doi.org/10.1163/9789004333512_006.

Mendelsohn, J. Andrew. 1998. "From Eradication to Equilibrium: How Epidemics Became Complex After World War I." In *Greater than the Parts: Holism in Biomedicine, 1920–1950*, edited by Christopher Lawrence and George Weisz, 303-331. Oxford: Oxford University Press.

Meslé, France, ed. 2010. "Recul spectaculaire de la mortalité due à la grippe: le rôle de la vaccination" [Spectacular Decline in Mortality Due to Influenza: The Role of Vaccination]. *Population & Sociétés* [Populations and Societies] 470: 1–4. Accessed August 30, 2024. https://www.ined.fr/fichier/s_rubrique/19138/pes470.fr.pdf.

Ministère de la Guerre [French War Ministry]. 1932. *Aperçu statistique sur l'évolution de la morbidité et de la mortalité générales dans l'armée et sur l'évolution de la morbidité et de la mortalité particulières à certaines maladies contagieuses, de 1862 jusqu'.à nos jours* [Statistical Overview of the Evolution of General Morbidity and Mortality in the Army and of the Evolution of Morbidity and Mortality Specific to Certain Contagious Diseases, from 1862 to the Present Day]. Paris: Imprimerie nationale [National Press].

Monnais-Rousselot, Laurence. 2007. "Ordonnance coloniale, prescriptions médicales et changement social: L'offre et la demande en médicaments dans le Viêt Nam de la première moitié du XXe siècle" [Colonial Medical Prescriptions and Social Change: Supply and Demand of Medicinal Products in Vietnam in the First Half of the 20th Century] *Genèses* 4(69): 26–48. https://doi.org/10.3917/gen.069.0026.

Murard, Lion, and Patrick Zylberman. 2003. "Mi-ignoré, mi-méprisé: le ministère de la santé publique, 1920-1945" [Half-ignored, Half-despised: The Ministry of Public Health, 1920-1945]. *Les*

Tribunes de la santé [Health Tribunes] 1(1): 19–33. https://doi.org/10.3917/seve.001.33.

Picard, Pierre. 1927. *Traitement des broncho-pneumonies infantiles par les vaccins et en particulier par le vaccin de Weill et Dufourt* [Treatment of Childhood Bronchopneumonia with Vaccines and in Particular with the Weill and Dufourt Vaccine]. Lyon: de Bosc frères et Riou Press.

Porter, Dorothy. 1999. *Health, Civilization and the State: A History of Public Health from Ancient to Modern Times*. London: Routledge.

Pouget, Benoît. 2020. *Un choc de circulations: La puissance navale française face au cholera en Méditerranée, 1831–1856* [A Shock of Circulations: French Naval Power Facing Cholera in the Mediterranean, 1831–1856]. Rennes: Presses Universitaires de Rennes.

Rasmussen, Anne. 2004. "Du vrai et du faux sur la Grande Guerre bactériologique: Savoirs, mythes et représentations des épidémies" [Truth and Falsehood about the Great Bacteriological War: Knowledge, Myths and Representations of Epidemics]. In *Vrai et faux dans la Grande Guerre* [Truth and Falsehood during the Great War], edited by Christophe Prochasson and Anne Rasmussen, 189–207. Paris: La Découverte.

———. 2007. "Dans l'urgence et le secret: Conflits et consensus autour de la grippe espagnole, 1918–1919" [In Urgency and Secrecy: Conflicts and Consensus around the Spanish flu, 1918–1919] *Mil neuf cent. Revue d'histoire intellectuelle* [Nine hundred: Journal of Intellectual History] 25(1): 171–190. https://doi.org/10.3917/mnc.025.0171.

———. 2008. "À corps défendant: Vacciner les troupes contre la typhoïde pendant la Grande Guerre" [Unwillingly: Vaccinating the Troops Against Typhoid during the Great War]. *Corps* [Bodies] 2(5): 41–48. https://doi.org/10.3917/corp.005.0041.

———. 2016. "Expérimenter la santé des grands nombres: Les hygiénistes militaires et l'armée française, 1850–1914" [Experimenting with the Health of Large Numbers: Military Hygienists and the French Army, 1850–1914]. *Le Mouvement Social* [The Social Movement] 4(257): 71–91. https://doi.org/10.3917/lms.257.0071.

Reiser, Stanley Joel. 1978. "The Emergence of the Concept of Screening for Disease." *The Milbank Memorial Fund quarterly. Health and Society* 56(4): 403–25. https://doi.org/10.2307/3349571.

Régnier, Christian. 2004. "Guerre bactériologique (1916–1933): De l'anecdote à la grande peur" [Bacteriological War (1916–1933): From the Anecdote to the Great Fear]. *Histoire des sciences médicales* [History of Medical Sciences] 38(2): 177–89.

Rey, Roselyne. 1994. "Les relations entre savoirs et pratiques" [Relations between Knowledge and Practices]. In *Pour l'histoire de la médecine: Autour de l'œuvre de Jacques Léonard* [For the History of Medicine: Around the Work of Jacques Léonard], edited by Michel Lagrée and François Lebrun, 97–104. Rennes: Presses universitaires de Rennes.

Schwarz, Jason L. 2018. "The Spanish Flu, Epidemics, and the Turn to Biomedical Responses." *American Journal of Public Health* 108(11): 1455–8. https://doi.org/10.2105/AJPH.2018.304581.

Selter, Hugo. 1918. "Zur Aetiologie der influenza" [On the Etiology of Influenza], August 22, 1918. *Deutsche Medizin Woche* [German Medicine Weekly], 932.

Shanks, Dennis G. 2014. "How World War 1 Changed Global Attitudes to War and Infectious Diseases." *Lancet* 384(9955) (9955): 1699–707. https://doi.org/10.1016/S0140-6736(14)61786-4.

Smallman-Raynor, Matthew R., and Andrew Cliff. 2006. *War Epidemics: An Historical Geography of Infectious Diseases in Military Conflict and Civil Strife, 1850–2000*. Oxford: Oxford University Press. https://doi.org/10.1093/oso/9780198233640.001.0001.

Tabuteau, Didier. 2007. "La sécurité sanitaire, réforme institutionnelle ou résurgence des politiques de santé publique?" [Health Security, Institutional Reform or Resurgence of Public Health Policies?] *Les Tribunes de la santé* [Health Tribunes] 3(16): 87–103. https://doi.org/10.3917/seve.016.0087.

———. 2015. "La santé publique en France, une histoire singulière" [Public Health in France, a Singular History]. In *Conjuguer la santé de l'enfant et de la famille au singulier et au pluriel: Du soin individuel à la santé publique* [Combining Child and Family Health in the Singular and Plural: From Individual Care to Public Health], edited by Colette Bauby and Pierre Suesser, 17–44. Toulouse: Érès. https://doi.org/10.3917/eres.sues.2015.01.0017.

Taubenberger, Jeffrey K., and David M. Morens. 2006. "1918. Influenza: The Mother of all Pandemics." *Emerging Infectious Diseases* 12(1): 15–22. https://doi.org/10.3201/eid1201.050979.

Tognotti, Eugenia. 2003. "Scientific Triumphalism and Learning from Facts: Bacteriology and the 'Spanish Flu' Challenge of 1918." *Social History of Medicine* 16(1): 97–110. https://doi.org/10.1093/shm/16.1.97.

Vagneron, Frédéric. 2015a. "Aux frontières de la maladie: L'histoire de la grippe pandémique en France (1889–1919)" [At the Frontiers of Disease: The History of Pandemic Influenza in France (1889-1919)]. Doctoral Thesis in History. Paris: EHESS. Accessed September 3, 2024. https://journals.openedition.org/acrh/7200.

———. 2015b. "Surveiller et s'unir? Le rôle de l'OMS dans les premières mobilisations internationales autour d'un réservoir animal de la grippe" [Surveil and Unite? The Role of the WHO in the First International Mobilizations around an Animal Reservoir of Influenza]. *Revue d'anthropologie des connaissances* [Journal of Anthropology of Knowledge] 9(2): 139–162. http://journals.openedition.org.lama.univ-amu.fr/rac/3108.

———. 2020. "Déchiffrer la grippe russe: Quand une pandémie devient un événement statistique (1889–1893)" [Deciphering the Russian Flu: When a Pandemic Becomes a Statistical Event (1889–1893)]. *Population* 75(2–3): 359–389. https://doi.org/10.3917/popu.2002.0359.

Viet, Vincent. 2015. *La santé en guerre, 1914–1918: Une politique pionnière en univers incertain* [Health at War, 1914–1918: A Pioneering Policy in an Uncertain World]. Paris: Presses de Sciences Po.

Vinck, Dominique, and George Weisz. 2007. "Préface. Les mutations de l'action publique sanitaire: Quelle histoire et quelle place donner aux régimes de production des connaissances?" [Preface. Changes in Public Health Action: What History and What Place Should Be Given to Regimes of Knowledge Production?] In *La gouvernance des innovations médicales* [The Governance of Medical Innovations], edited by Virginie Tournay, 5–15. Presses Universitaires de France. https://doi.org/10.3917/puf.tourn.2007.01.0005.

Weindling, Paul. 1986. "Medicine and Modernization: The Social History of German Health and Medicine." *History of Science* 24(3): 277–301. https://doi.org/10.1177/007327538602400302.

Archival References

FMA 1. Reports of Patients with Influenza in Military Hospitals and Military Wards of Paris Hospices sent every Three Days by the Director of the Health Service of the Military Region of Paris to the Medicine Section of the Technical Services between January 6 and March 15, 1933, SHD/V/GR/9NN7/881, French Military Archives, Ministry of War, Archives of the Health Services Directorate, sub-series GR 9NN7, (hereafter called FMA Manuscripts), Vincennes, France

FMA 2. Note from the Central Directorate of the Army Health Service to the Civilian Office of the Minister of War, March 26, 1935, SHD/V/GR/9NN7/890, FMA Manuscripts.

FMA 3. Report on G Vaccine for Preventive and Curative Purposes, prepared by the Institut Pasteur, Annex to the Report of a Meeting for the Study of Vaccination Against Influenza Infections, Under-Secretary of State for the Military Health Service, October 28, 1919, SHD/V/GR/9NN7/871, FMA Manuscripts.

FMA 4. Note on the use of pneumococcal sera in the treatment of certain complications of influenza, undated, SHD/V/GR/9NN7/871, FMA Manuscripts.

FMA 5. Minutes of the Meeting for the Study of Vaccination in Influenza Infections, October 28, 1918, SHD/V/GR/9/NN7/871, FMA Manuscripts.

FMA 6. Minutes of the September 10, 1918, Session of the National (French) Medicine Academy, *Official Journal of the French Republic*, September 19, 1918, 8205, National (French) Medicine Academy.

FMA 7. Draft Instruction on Influenza Prophylaxis, May 30, 1929, SHD/V/GR/9NN7/835, FMA Manuscripts.

FMA 8. Note from the director of the Army health service, January 18, 1933, SHD/V/GR/9NN/7/866, FMA Manuscripts.

FMA 9. Report by the Military Doctor Hamon on the Use of Vaccinotherapy and Serotherapy during the Epidemic, June 9, 1935, SHD/V/GR/9NN7/894, FMA Manuscripts.

FMA 10. Dispatch slip for documents from Sapper Pierre Evain's file, February 11, 1933, SHD/V/GR/9NN7/881, FMA Manuscripts.

FMA 11. Clinical Observations of the Sapper Pierre Evain, the Chief Doctor of the Place and of the Mixed Hospital of Angers, on February 9, 1933, SHD/V/GR/9NN7/881, FMA Manuscripts.

FMA 12. Letter from the Director of the Army Health Service in the 14th Military Region (Lyon) to the Director of the Army Health Service, June 7, 1935, SHD/V/GR/9NN7/890, FMA Manuscripts.
FMA 13. Letter from the Director of the Health Service of the 2nd Military Region (Amiens) to the Director of the Army Health Service, June 21, 1935, SHD/V/GR/9NN7/894, FMA Manuscripts.
FMA 14. Note on the Inspection Route of the Infirmaries and Hospitals of Paris, 1935, SHD/V/GR/9NN7/891, FMA Manuscripts.
FMA 15. Note from the Military Cabinet of the Minister of War for the Services of the Central Administration, March 10, 1935, SHD/V/GR/9NN7/892, FMA Manuscripts.
FMA 16. Circular, November 30, 1918, N°34.252 B4/7, SHD/V/GR/9NN7/866, FMA Manuscripts.
FMA 17. Instruction on the Prophylaxis of Acute Bronchopulmonary Diseases of Influenza Origin or Not, October 10, 1918, SHD/V/GR/9NN7/866, FMA Manuscripts.
FMA 18. Circular [related to prophylaxis], April 17, 1920, N°6.923 B4/7, SHD/V/GR/9NN7/866, FMA Manuscripts.
FMA 19. Circular [related to prophylaxis], May 4, 1921, N° 4.564 B 4/7, SHD/V/GR/9NN7/866, FMA Manuscripts.
FMA 20. Letter from the Minister of War to the Commanding Generals of Military Regions and Army Corps, January 6, 1933, SHD/V/GR/9NN7/866, FMA Manuscripts.
FMA 21. Note from the Director of the Army Medical Service to the Army General Staff, February 20, 1935, SHD/V/GR/9NN7/890, FMA Manuscripts.
FMA 22. Weekly Reports of the Sessions of the Academy of Sciences, Session of September 30, 1918: *Prophylaxis and Treatment of Influenza*, Note by M. M. Defressine and H. Violle presented by M. Roux, Paris: Gauthier-Villars, 1918, 503–4.
FMA 23. Conference on Influenza Prophylaxis by Doctor Inspector General Vincent, to the Regional Directors of the Health Service, January 24, 1922, SHD/V/GR/9NN7/866, FMA Manuscripts.
FMA 24. Letter from the Technical Department of the Army Health Service to the Director of the Health Service of the French Army of the Rhine, February 18, 1929, SHD/V/GR/9NN7/728, FMA Manuscripts.
FMA 25. Report on the Use in the Health Facilities of the 1st Region (Lille) of Paper Mouth Covers, April 30, 1926, SHD/V/GR/9NN7/725, FMA Manuscripts.
FMA 26. Letter from the Director of the Health Service of the 18th Army Corps to the Minister of War, April 28, 1926, SHD/V/GR/9NN7/725, FMA Manuscripts.
FMA 27. Report on the Number of Paper Mouth Covers for the Year 1926, SHD/V/GR/9NN7/728, FMA Manuscripts.
FMA 28. Letter from the Director of the Health Service of the 6th Region (Metz) to the Director of the Military Health Service, November 14, 1929, SHD/V/GR/9NN7/725, FMA Manuscripts.
FMA 29. Letter from the Head of the Technical Section of the Health Service to the Director of the Armed Forces Health Service, October 16, 1931, SHD/V/GR/9NN7/728, FMA Manuscripts.
FMA 30. Letter from the Permanent Medical Inspector General of Equipment and Establishments of the Military Health Service to the Minister of War (7th Office), January 2, 1928, SHD/V/GR/9NN7/656, FMA Manuscripts.

FMA 31. Handwritten Note [without signature], June 24, 1931, SHD/V/GR/9NN7/728, FMA Manuscripts.

FMA 32. Letter from the Minister of War to the Director of Supplies of the Army Health Service, December 3, 1929, SHD/V/GR/9NN7/728, FMA Manuscripts.

FMA 33. Letter from the Director of Supplies of the Army Health Service to the Central Director of the SSA, March 6, 1931, SHD/V/GR/9NN7/728, FMA Manuscripts.

FMA 34. Letter from the Manager of the Docks of the Health Service in Vanves (near Paris) to the Director of Supplies and Central Establishments of the Army Health Service, December 27, 1929, SHD/V/GR/9NN7/728, FMA Manuscripts.

FMA 35. Letter from the French Embassy in Japan to the Direction du service de santé des armées, September 6, 1929, SHD/V/GR/9NN7/867, FMA Manuscripts.

FMA 36. Information Note Concerning the Flu Mask in the Japanese Army, 1929, SHD/V/GR/9NN7/867, FMA Manuscripts.

FMA 37. Letter from the Technical Inspectorate of Engineering Works to the Technical Department of the Army Medical Corps, March 13, 1930, SHD/V/GR/9NN7/867, FMA Manuscripts.

FMA 38. Letter from the Health Service Directorate to General Duchêne. January 28, 1937, SHD/V/GR/9NN7/867, FMA Manuscripts.

FMA 39. Report on the Functioning of the Val de Grâce (Paris) Laboratory, 1933, SHD/V/GR/9NN7/594, FMA Manuscripts.

FMA 40. Report on the Functioning of the Regional Chemical Laboratory of the First Military Region (Lille), 1933, SHD/V/GR/9NN/7/594, FMA Manuscripts.

FMA 41. Report on the Functioning of the Laboratory of the Talence Military Hospital (Bordeaux area), June 30, 1936, SHD/V/GR/9NN/7/594, FMA Manuscripts.

FMA 42. Technical note on the morphology of Pfeiffer's bacillus by René Legroux of the Institut Pasteur, 1919, SHD/V/GR/9NN/7/866, FMA Manuscripts.

FMA 43. Note from the Director of the Military Health Service of the 6th Region, May 1835, SHD/V/GR/9NN7/894, FMA Manuscripts.