



THE ELLIPSIS OF PROGNOSIS IN MODERN MEDICAL THOUGHT

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Abstract—Contemporary textbooks of internal medicine give scant attention to the prognosis of diseases. Has this always been the case? If not, when and why did prognosis come to be de-emphasized? Using a highly regarded, standard medical textbook initially authored by William Osler, *The Principles and Practice of Medicine*, I performed qualitative and quantitative content analysis of entries regarding lobar pneumonia in selected editions published between 1892 and 1988, with special attention to the period between 1892 and 1947. I chose lobar pneumonia because it was a leading cause of death throughout this period and because it is recognizable across time, thus making it possible to follow the evolution in clinical thinking about prognosis while holding constant the diagnosis. I argue that two powerful forces converged to lead to the ellipsis of prognosis: (1) the emergence of effective therapy, and (2) a fundamental change in the cognitive basis of medicine. With respect to the former, I show that there is a complementary, inverse relationship between the clinical acts of prognostication and therapy; as one increases in salience in the management of a disease, the other decreases. With respect to the latter, I argue that the particular clinical facts deemed to be important about a patient's case have shifted over time, and I explore changes in the clinical and cognitive foundations of physicians' estimation of patients' prognoses—in particular, “symptoms” and “complications.” I conclude that, concurrent with a shift in clinical thought from an individual-based to a diagnosis-based conceptualization of disease, prognosis came to be seen as intrinsic to diagnosis and therapy, and explicit attention to prognosis consequently diminished. Copyright © 1997 Elsevier Science Ltd

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Current textbooks of internal medicine typically divide their discussion of diseases into four sections on etiology, clinical presentation, diagnosis, and therapy. These texts infrequently consider prognosis explicitly, and even less frequently do they devote special sections to prognosis [1]. This organization of modern textbooks mirrors modern medical practice, in which physicians tend to avoid explicit discussion of prognosis and instead focus on diagnosis and therapy [1]. Nevertheless, prognostic concerns have an extremely important impact on how textbooks and physicians alike frame and address disease.

The ellipsis of explicit prognostication from current textbooks and practice is partly a consequence of the contemporary dominance of an ontological view of disease—a view in which disease is seen as generic and independent of its expression in an individual. Making a diagnosis has become the central concern of the clinical encounter in part because prognosis and therapy are seen to follow necessarily and directly from it. The ontological perspective is further reinforced when an effective therapy for a disease exists because effective therapy further narrows the range of possible outcomes a disease might have. Once a diagnosis is made and effective therapy is initiated, the clinical course of a disease is often presumed to be relatively fixed, non-indivi-

dualistic, and standardized. The conflation of diagnosis and prognosis, and the reduction of prognostic variability through the application of effective therapy, are complex phenomena that imply an evasion of the individual and the idiosyncratic. Yet, in another sense, it is the idiosyncratic, the individual, and the atypical which define the prognosis, as we shall see.

If it is indeed true that physicians presume that diagnosis and therapy *specify* prognosis, we would expect that when therapeutic options are substantial, prognosis would be relatively neglected—in large part because the prognosis would be assumed. More specifically, when therapeutic options are manifold and effective, the salience and importance of prognosis should be minimized and clinical concern should be focused on diagnosis and therapy. Conversely, when therapeutic options or diagnostic knowledge or both are limited, physicians should deem prognosis to be a more central clinical task.

Drawing on historical material and using the perspective of the sociology of knowledge, I will here explore the relationships among diagnosis, prognosis, and therapy. My most general concern will be to examine the tradeoff between therapy and prognosis. Has prognosis always played such a minor role in clinical discourse? If not, when and why did it come to be de-emphasized? I will show that there

is a complementary, inverse relationship between the clinical acts of prognostication and therapy—that as one increases in salience in the management of a disease, the other decreases. While I believe that this is a general phenomenon that holds both in the actual treatment of real patients and in the construction of theoretical knowledge in medicine (as reflected in textbooks), I will concentrate only on the latter here.

I will argue that two powerful forces converged to lead to the ellipsis of prognosis: (1) the emergence of effective therapy, and (2) a fundamental change in the cognitive basis of medicine. With respect to the latter, I will argue that the particular clinical facts deemed to be important in a patient's case have shifted across time, and I will explore how the clinical and cognitive foundations of physicians' estimation of patients' prognoses have shifted, particularly as represented by the concepts of "symptoms" and "complications." These foundations are linked with the notion of "typicality" and "atypicality" and with the notion that some parts of a patient's presentation and course are *generic to the disease* and some are *specific to the individual*. It is the latter, I will argue, that form the bases for prognostication in physicians' minds. I will argue that clinical thought has progressively moved from an individual-based to a diagnosis-based conceptualization of disease, that prognosis has been progressively presumed to be intrinsic to diagnosis and therapy, and that explicit attention to prognosis has consequently diminished. Thus, my focus here is on the relationship between therapy and prognosis, between the generic and the individual, and between the typical and the atypical.

METHOD AND PLAN OF ANALYSIS: LOBAR PNEUMONIA FROM 1892 TO 1988

To study the bases of medical thinking about prognosis, I employed content analysis of a series of textbook entries regarding lobar pneumonia spanning the century from 1892 to 1988, with special attention to the period between 1892 and 1947 [2–4]. There are two rationales for this strategy. First, the period between 1892 and 1947 largely precedes the advent of effective therapy for pneumonia, and outcomes of pneumonia were often quite bad [5]. When little could be done about this life-threatening disease, we may rightly expect that patients and physicians alike would be concerned with identifying which patients would do well and which would not. Second, since this period includes the introduction of manifestly efficacious antibiotic therapy for infectious diseases such as pneumonia in the late 1930s, we were able to test whether prognosis becomes effaced when therapy becomes dominant, and whether the textbooks come to adopt the "modern" form of entry (that omits information

about prognosis) shortly after antibiotics were discovered.

I selected lobar pneumonia since its recognition and diagnosis have not changed much over the period under consideration, whereas its treatment and prognosis have. Since this condition is readily recognizable across time, it should be possible to follow the evolution in clinical thinking about prognosis, while holding constant the particular disease in question (along with its clinical manifestations, recognition, and diagnosis). An additional reason for the selection of pneumonia is that it was a leading cause of death throughout the period from 1892 to 1947. In 1900, for example, it was the leading killer in the United States, and it was still one of the top five killers in and well beyond 1947 [6, 7]. Many physicians during this period regarded pneumonia as the prototypical condition they faced; in 1924, for example, pneumonia was described as "one of the most widespread and fatal of all acute diseases" and was known as "Captain of the Men of Death." ([2], p. 78)

The texts I subjected to close reading are the entries for lobar pneumonia in all editions of a highly regarded and standard textbook initially authored by William Osler, *The Principles and Practice of Medicine*. Twenty-two editions of this textbook appeared between 1892 and 1988, and I comprehensively reviewed the entries for lobar pneumonia in all of them. I will here cite solely from the 1892, 1924, and 1947 entries [2–4].

William Osler (1849–1919) first published his landmark textbook in 1892, introducing it into a transition period in American medicine and medical education [8, 9]. By the end of the 19th century, "therapeutic nihilism"—that is, the idea that much of the available therapy was ineffective, if not harmful, and should be forsworn—was firmly entrenched among elite physicians [10]. At the same time, there was a new emphasis on understanding the patient's social condition and its impact upon the management and course of the patient's disease. There was also increasing emphasis on direct physical examination, prompted in large measure by the invention of the stethoscope [11]. Doctors and patients moved closer together, physically and personally. By 1927, Francis Peabody, the influential Harvard Medical School professor, was to state that

The treatment of a disease may be entirely impersonal; the care of a patient must be completely personal. The significance of the intimate personal relationship between physician and patient cannot be too strongly emphasized, for in an extraordinarily large number of cases, both diagnosis and treatment are directly dependent on it... [12].

Further, in the period from 1850 to 1920, patients and doctors were increasingly meeting in institutional settings, and this also had an impact upon the nature of the therapeutic encounter, depersonalizing the interaction and fostering specialized and fragmented care [9].

Osler deplored the other textbooks then available, criticizing them as being mere "lecture notes" and unsystematic [13]. Osler was sole author of the textbook until 1909, when the 7th edition appeared. Thomas McCrae, a former Osler resident who was Professor of Medicine at Jefferson Medical College, joined the 8th edition in 1912. After Osler's death and until his own death in 1935, McCrae authored the 9th to 12th editions. Henry Christian, Professor of Medicine at Harvard, then took over from the 13th edition (1935) until the 16th edition (1947). Subsequent editions, beginning with the 17th in 1968, have been authored by groups of physicians. This textbook had an extraordinary impact on medical education [14]. The early editions were intended to be practical guides, to be used by students and practitioners alike, and they were widely circulated. By 1906, 95% of medical schools were using it as a primary text [15]. By 1915, it had been translated into French, German, Spanish, and Chinese.

No textbook should be presumed perfectly to reflect the nature of clinical encounters and clinical practice. As with the description of any activity, there is surely a gap between the idealized procedures and practices described in writing and everyday clinical realities. But the widespread dissemination and rapid succession of editions of this textbook bespeak a significant impact. This was the "gold standard" text. It is thus possible, through this textbook, to glimpse how doctors thought about cases and about the *ideals* regarding clinical assessment. Similarly, no single disease can capture the full range of physician practice, but lobar pneumonia was and is a common concern of physicians.

In the sections that follow, I address several issues. First, I will show that there was little relationship between patient symptomatology and prognostication in the early part of this century, but that as effective therapy emerged, symptoms became a basis for the formulation of a patient's prognosis. In part, this resulted from a shift in the meaning of symptoms: no longer inherent to the disease nor generic to it, they became particularistic and individualistic. Second, I will examine a major foundation of prognostication, namely "complications." I will elucidate the difference between "symptoms" and "complications," and show how the relative prognostic significance of these two phenomena shifted over time. I will show that while symptoms increased in importance as a basis for prognostication between 1892 and 1947, complications decreased in importance. Third, I will examine the explicit consideration given by successive versions of the textbook to prognosis, showing how this consideration undergoes both transformation and diminution over time. I will also examine how prognostication has become restricted to a particular kind of clinical outcome, namely death—to the remarkable exclusion of other outcomes. I will

examine the consequences of this linkage between prognosis and mortality for the prominence of prognosis, and I will show that this linkage further supports the ellipsis of prognosis in certain diseases, such as pneumonia, where mortality declines after the introduction of effective therapy. Fourth and finally, I will show how a shift in the cognitive basis of medicine, most especially a shift in attention from the individual patient to the general disease entity, defined the role of prognosis in clinical thought.

THE RELEVANCE OF SYMPTOMS IN LOBAR PNEUMONIA

1892 Edition

The 1892 edition entry on lobar pneumonia opens by explaining that pneumonia is

An infectious disease characterized by inflammation of the lungs and constitutional disturbance of varying intensity. The fever terminates abruptly by crisis. Secondary infective processes are common. An organism, the *diplococcus pneumoniae*, is invariably found in the diseased lung. ([2], p. 511)

This definition combines local, systemic, and secondary symptoms of the disease. It also mentions that the recently characterized pathogen *diplococcus* is "invariably" found, although without actually asserting that it is the causative agent.

Nearly six pages of the 21-page entry are spent on a detailed description of the symptoms of pneumonia. In this and in all subsequent editions until 1947, overwhelming emphasis is placed on the symptomatic and diagnostic significance of fever, an emphasis out of proportion to the other symptoms of pneumonia, such as cough, dyspnea, or chest pain (all of which, incidentally, are *local*). By comparison, fever receives only scant attention in the 1968 and subsequent editions. However, in 1892, the text notes that the symptom of fever is rapidly followed by the inexorable development of typical lobar pneumonia:

Abruptly, or preceded by a day or two of indisposition, the patient has a severe chill, lasting from ten to thirty minutes. In no acute disease is an initial chill so constant or so severe. The fever rises quickly. There is pain in the side, often of an agonizing character. A short, dry, painful cough soon develops, and the respirations are increased in frequency. When seen on the second or third day the patient presents an appearance which may be quite pathognomonic. He lies flat in bed, often on the affected side; the face is flushed, particularly the cheeks; the breathing is hurried and the alae nasi dilate with each inspiration; the eyes are bright, the expression is anxious, and there is a frequent short cough which makes the patient wince and hold his side. The expectoration is blood-tinged and extremely tenacious. The temperature rises rapidly to 104° or 105°. The pulse is full and bounding and the pulse-respiration ratio much disturbed. Examination of the lung shows the physical signs of consolidation—blowing breathing and fine rales. After persisting for from seven to ten days the crisis occurs, and with a fall in tem-

perature the patient passes from a condition of extreme distress and anxiety to one of comparative comfort.

The fever of pneumonia rises abruptly with the chill, during which the rectal temperature may be high. In children and in cases without chill the rise is more gradual. The temperature reaches 104° or 105° and is continuous, with a variation of a degree to a degree and a half. If a two-hour record is kept the diurnal variations are seen to follow the normal type. In children and healthy adults the fever is usually higher than in old persons and drunkards. After continuing for from five to nine days the temperature falls abruptly, forming what is known as the *crisis*, so characteristic in a large proportion of the cases. In from five to twelve hours the temperature may fall with degrees. The crisis may occur as early as the third day or as late as the twelfth or fourteenth. A *pseudo-crisis* may occur on the fifth day or earlier. Defervescence may take place gradually by lysis. In cases of delayed resolution the fever may persist for weeks. ([2], p. 517)

Following the course of the important and ubiquitous symptom of fever was essential to following the patient's course, essential to the recognition of the imminent resolution of the illness, essential to the diagnosis, and essential to the symptomatic management of the illness. However, remarkably, it was only a minor factor in the physician's estimation of the patient's prognosis, especially for death. In this respect, fever is like the many other symptoms and signs considered in the text. Respiratory symptoms (e.g., dyspnea, pleuritic pain, and cough), circulatory symptoms (e.g., pulse disturbances), anemia, splenomegaly, headache, convulsions: none are linked to prognosis in the text.

Only two symptoms are singled out for explicit consideration of their prognostic implications, and the text appears skeptical about their significance [16]. In discussing the microscopic appearance of blood in patients with pneumonia, the text states that the "leucocytosis disappears as soon as the crisis occurs. Its absence during the fastigium is considered to indicate an unfavorable prognosis" ([2], p. 520). And, in discussing skin findings in patients with pneumonia, the text notes the frequent association between oral herpes and pneumonia and remarks that

[Oral herpes] is supposed to be of favorable prognosis, and figures have been quoted in proof of this association. It may also occur on the nose or on the genitals. Its significance and relation to the disease are unknown. ([2], p. 521)

Osler is unpersuaded, it seems, about the prognostic significance even of these two symptoms.

This absence of a linkage between symptoms and prognosis in the 1892 edition suggests that, at this time, symptoms did not acquire significance based on the prognosis they imply. Symptoms *per se* were relevant to making a diagnosis, to selecting therapy (e.g., to relieve particular symptoms), and to following the course of the illness. But they were *not* a basis for the formulation of a prognosis.

1924 Edition

The entry for lobar pneumonia in 1924 begins with the following definition:

An infection caused by the pneumococcus, characterized by inflammation of the lungs, a toxæmia of varying intensity, and a fever which usually terminates by crisis. Secondary infective processes are common. ([3], p. 78)

Fever and secondary infective processes remain prominent. Though there is no longer any ambiguity about the role of the bacterium *pneumococcus*, a number of other etiologic or predisposing factors are also considered later in the chapter, including age, sex, race, social condition (such as urban habitation or exposure to "hardship"), alcoholism, prior episodes, trauma, and season.

The discussion of symptoms in this edition is more extensive than in 1892. The section on symptoms, which occupies just over seven pages of the 36-page entry, is introduced by noting that the "course of the disease in *typical* cases" will be discussed ([3], p. 84, emphasis added). No mention is made of how symptoms might be expressed in atypical cases or of how symptoms might be eliminated or relieved with treatment. Symptoms *per se* are seen as the province of *typically* expressed pneumonia. The entire discussion assumes no therapeutic interventions on the part of the physician throughout the course of the illness.

Again, the symptom receiving the most stress and emphasis, and yet the one which is least specific to pneumonia, is fever. Other symptoms—pain, dyspnea, cough—are also discussed, with little change from the 1892 edition. Only one symptom in the whole chapter is explicitly linked to prognosis, and again it is herpes ([3], p. 91). An additional three symptoms are, however, assessed in terms of their "seriousness" or "gravity." A clinical finding known as "paradoxical breathing" is described as having "grave significance" ([3], p. 86). Another symptom, "meteorism," is termed "distressing and sometimes dangerous" ([3], p. 90). Finally, in the discussion of right-sided heart failure accompanied by cyanosis, the text states:

Even when these symptoms are very serious, recovery may take place. In other instances without any special warning death may occur even in robust, previously healthy men. The heart weakness may be due to paralysis of the vasomotor center and consequent lowering of the general arterial pressure. ([3], p. 89)

This passage implies that when a symptom such as cyanosis is "serious," recovery is generally not expected.

No other symptom in the section is considered in terms of its prognosis. Other symptoms or signs which today might be regarded as very grave, such as hemiplegia or high leukocytosis, are *not* linked to prognosis. That is, not all extreme, dramatic, or consequential symptoms are considered to have prognostic significance. Only very few are singled

out for attention. This observation once again supports the contention that in the early part of this century, in the case of pneumonia at least, prognosis was *not* configured as being dependent upon the particular symptoms or signs that a given patient had. Conversely, symptoms were not assessed in terms of how they affected the patient's prognosis [17].

1947 Edition

The 1947 edition, in prefatory remarks to the chapter on pneumonia, states:

A variety of organisms, both bacteria and viruses, cause the pneumonias. The pneumococcus is a very frequent cause; very often it causes a lobar pneumonia, although less frequently other bacteria cause it. With present day therapy the etiology of pneumonia is of primal importance, and hence the pneumonias for discussion have been classified on an etiologic basis. ([4], p. 41)

Thus, the emergence of efficacious and specific therapy makes differential diagnosis a critical part of clinical care, and self-consciously so. The stakes in accurate diagnosis are now higher. As we shall see, it is not just the etiologic classification scheme which was obliged to undergo revision by the introduction of manifestly efficacious therapy in the late 1930s. The discovery of antibiotics also changed diagnosis, clinical symptomatology, and prognosis.

As usual, the chapter on lobar pneumonia, now entitled "Pneumococcus Pneumonia," opens with a definition:

The pneumococcus most frequently causes lobar pneumonia, less frequently focal or lobular pneumonia or bronchopneumonia; these are acute infectious diseases often characterized by extensive massive inflammation of the lungs, a toxemia of varying intensity and a fever, which terminates by crisis in about 50 per cent of the cases. ([4], p. 41).

Fever remains fundamental to the definition, but the definition differs from prior ones in that the reference to "secondary infective processes" is no longer present, as if these processes are, in the idealized description of the textbook at least, reliably being averted through the use of antibiotics.

Obviously, the emergence of antibiotics affected not only the differential diagnosis of pneumonia, but also the clinical course of the disease. The text notes that "At the present time *typical* pneumococcal lobar pneumonia is not a very frequently observed disease" ([4], p. 41, emphasis added). Similarly, the section on morbid anatomy is now prefaced by the following remarks:

[The] *classical* pathology...[and] its coexistent physical signs now has become an infrequent occurrence as a result of change that has taken place in the type of pneumonia whose incidence is greatest and as a result of prompt, effective chemotherapy. ([4], p. 44, emphasis added)

Nevertheless, the section on symptoms, which occupies nine pages of the 35-page entry, gives a description of the "clinical course in a *typical* case

of pneumococcus lobar pneumonia" ([4], p. 48, emphasis added) that is virtually unchanged since the first edition in 1892. The "course" that is described still assumes no treatment with effective therapy. Special attention is still paid to the fever and the crisis, but a new remark has been added: "the degree of fever is no guide to the severity of the infection" ([4], p. 49).

A few signs and symptoms are singled out for their prognostic significance. With respect to cyanosis once again, the text notes: "the deep, purplish cyanosis, often seen early, is not so serious as the later, lavender or grayish cyanosis, in which anoxemia is relatively more marked" ([4], p. 49). With respect to the pulse: "the pulse may be full, soft, very deceptive and of no value whatever in prognosis from its character, but an increased rate always is important" ([4], p. 52). Also with respect to pulse: "the soft, easily compressed, shock type of pulse, gray facies, cold hands and feet, clammy perspiration and the progressive prostration tell of a toxic action on the circulation and are of bad omen" ([4], p. 53). Regarding atrial fibrillation, the text states that it "usually indicate[s] serious cardiac damage but [is] not necessarily of serious omen" ([4], p. 53). Jaundice, the text states, "has no close relationship to prognosis" ([4], p. 54). Finally, regarding another sign: "Asynchronous contractions of the respiratory muscles occur in some cases [and this finding] is of grave significance" ([4], p. 55). Thus, much more so than in the 1924 edition, symptoms are termed "serious" or "important" when they have prognostic significance (when they are "bad omens" or "ominous"). This is a new development compared with the text of 1892, wherein symptoms did *not* acquire their importance based on their prognostic implications. Coincident with the introduction of antibiotics, in other words, particular symptoms are evaluated in terms of their prognosis.

Why is this? In early texts, symptoms are taken as natural, inevitable, and intrinsic parts of pneumonia. However, the patient with a fever of 105°, for example, is no longer seen as natural in 1947. Whereas high fever, pleuritic pain, and rusty sputum were viewed as normal in 1892, after the emergence of antibiotics, not only are they not normal, but their appearance suggests something with serious prognostic significance: namely, that the illness is refractory to ordinarily effective medical intervention. Symptoms have become a basis for prognosis and have acquired a new meaning.

Before the emergence of effective therapy, physicians viewed symptoms against the ground of "natural history," which is how they understood what was happening to the patient. After the emergence of effective therapy, disease was no longer expected to pursue a "natural" course (indeed, pursuit of a natural course was viewed unfavorably). The new ground is that of effective therapy, and

symptoms, which indicate that therapy is not effective, are singled out as particularly problematic.

The emergence of a new ground against which to view the disease is to some extent acknowledged explicitly in the texts. The 1947 edition dedicates a short, special section to the “Effects of Chemotherapy on Signs, Symptoms, Physical Signs and Clinical Course.” Such a section was apparently not considered necessary in subsequent editions of the textbook, presumably reflecting the presumption that the use of antibiotics was routine and the consequences well-known. This section appears for the first and only time in the 1947 edition and reads as follows in its entirety:

With the introduction and prompt and almost universal use of chemotherapy, pneumococcal pneumonia has such a reduced duration and relatively mild course that much of what has been described under these headings is encountered rarely, in very mild form or even not at all. The pneumonia so familiar to physicians of a preceding generation is rapidly becoming one of the unusual clinical pictures. ([4], p. 57)

As noted still later in the 1947 entry, what was formerly typical has now become atypical:

... promptly used chemotherapy may be expected to modify the findings in pneumonia making them less marked, less typical of the usual picture of lobar pneumonia as seen prior to the use of chemotherapy. ([4], p. 57)

The emergence of effective therapy has changed the nature of what is typical in ways beyond making certain findings less marked. These changes had ramifications for prognostic thinking, as we shall see.

Summary

Prior to the emergence of effective therapy, symptoms are rarely, if ever, linked to prognosis. Moreover, certain symptoms are considered to be generic to the disease in the sense that they are an intrinsic part of it (they are indeed necessary for the diagnosis to be made) and in the sense that they tend to appear consistently. As a result, these findings are considered to be *typical*. The emergence of antibiotics coincides with two developments. First, a larger number of symptoms acquire prognostic significance. Second, therapy has modified the expression of the disease so that many symptoms that used to be considered “normal” are no longer so.

COMPLICATIONS VERSUS SYMPTOMS

In all of these editions of the textbook, certain disease manifestations are explicitly treated as “complications” and set aside in sections so-named. These manifestations are not considered to be symptoms, signs, sequelae, related conditions, or otherwise typical or natural parts of pneumonia. What is the nature of such manifestations, how do they differ from symptoms, what is their prognostic significance, and how do they change over time?

The construction of the meaning of “complication” and the manner in which the various manifestations of a disease came to be termed “complications” is critical to the understanding of how physicians prognosticate. As we shall see, the editions of this textbook progressively demonstrate that the formulation of a prognosis depends critically upon the nature of the complications, and, by extension, on the atypicality of the given case. In a reciprocal fashion, whether a particular symptom is considered a complication depends in large measure on the prognosis it implies. Complications determine the prognosis and, conversely, prognostic import distinguishes complications from their more straightforward and unproblematic relatives, “sequelae” or “symptoms.”

1892 Edition

The section on “Complications” in the 1892 edition begins by stating that “many [complications] seem to depend directly on the invasion of the body by the diplococci” ([2], p. 522). The implicit meaning here is invasion of parts of the body *other* than the lung; a complication is a symptom or finding attributable to the *atypical*—specifically non-local—location of the pathogen. The text considers several complications, the most important of which are pleurisy, pericarditis, endocarditis, and meningitis. Rarer complications include peripheral neuritis, gastric manifestations, jaundice, parotitis, arthritis, and nephritis.

Meningitis is identified as important because of its link with fatality:

By far the most important complication is the pneumonic meningitis, which varies much at different times and in different places. My Montreal experience is rather exceptional, as eight per cent of the fatal cases had this complication. It usually comes on at the height of the fever and in the majority of cases is not recognized unless, as before mentioned, the base [of the brain] is involved, which is not common. Meningitis may develop later in the disease and is then more easily diagnosed. ([2], p. 523)

Three points about this passage are noteworthy. First, it provides a hint as to the reason so much stress is placed on fever: the most dread complication is said to “usually” arise at the height of fever; fever, in part, is therefore to be feared for its link to meningitis. Second, according to this passage, the complication of meningitis is typically not even recognized; it remains occult. And third, a complication, *unlike* a symptom, appears to acquire its importance based on its prognostic significance.

The interaction between complications and prognosis reaches its height in the 1924 edition of the textbook, and I shall return to it below, but much of the interaction is prefigured in this first edition of the textbook and also in a paper written by Osler in 1897, “On Certain Features in the Prognosis of Pneumonia” [18]. This paper consists of five cases, all marked by “fatal complications,” and all, by

Osler's admission, "unusual" or "striking" in that they are "variations from the *typical* picture" ([18], p. 3, emphasis added). All show "clinical features... [more] of a profound intoxication than of any *local* disorder" ([18], p. 3, emphasis added), and manifest various cardiac or renal complications at autopsy. The deadly, toxic symptoms are believed to "overshadow entirely the local and more usual features of the disorder" ([18], p. 5). A superficial reading of this text leaves unclear the link between the cases described and the topic, namely "prognosis of pneumonia." But closer inspection reveals that when Osler is speaking of prognosis here, he is speaking of *unusual* presentations which also are characterized by *death*. He is not speaking about either the usual course or about the non-fatal course of the illness. Moreover, the very form of the paper, consisting of case narratives culminating in death, suggests that for Osler, prognosis was equivalent to describing the natural history of an individual encounter with disease that culminates in death. The paper is written in a way that presumes that the "prognosis of pneumonia" is individual and reflective of disease outcome in particular people.

1924 Edition

In the 1924 edition, some potentially serious and grave manifestations of pneumonia are explicitly deferred from the section on symptoms to the section on "Complications" for consideration. These conditions include endocarditis, pericarditis, meningitis, and jaundice. The text clearly defines some clinical findings as "symptoms" and others as "complications." But why is it, for example, that some symptoms, such as "diffuse erythema," are considered skin *symptoms* and others, such as jaundice, are termed *complications* and relegated to a different section of the chapter?

Unfavorable prognosis is one of the main ways that a complication is distinguished from a symptom. This may explain why a serious clinical finding that is extreme and generally irremediable, such as hemiplegia, is configured as a symptom and not as a complication ([3], p. 91). The occurrence of hemiplegia, while very bad for the patient, does not mean that the patient will be at increased risk of further maloccurrence; it does not affect his or her chances for survival of the pneumonia. Symptoms that are complications, in other words, herald further misfortune in the near future; they have specific—and unambiguously grave—*prognostic* consequences.

The discussion of complications in the 1924 edition occupies two pages in a section following the section on "Symptoms." The "Symptoms" section opens with the statement that it is about "typical" cases, giving the distinct impression that the succeeding section, on "Complications," is about the course of disease in *atypical* cases. As we have seen, this notion was prefigured in the 1892 version.

Atypical cases are ones in which complications occur, and, conversely, atypicality is a defining feature of a clinical occurrence that comes to be termed a complication.

In general, the text states that "pneumonia has but few complications" ([3], p. 92), and it begins with a discussion of pleurisy:

Pleurisy is an inevitable event when the inflammation reaches the surface of the lung, and thus can scarcely be termed a complication. But there are cases in which the pleuritic features take first place. ([3], p. 92)

These two sentences imply two things about the nature of complications. First, infrequency is a key element in making a clinical occurrence "atypical" and hence a complication. A frequent clinical occurrence cannot, it seems, ordinarily be a complication of a condition. This is further supported by the fact that, of the 16 specific entities identified as complications, seven are explicitly described as "rare" or "uncommon" and none of the others is described as "frequent" or "common" [19]. By comparison, few "symptoms" are described in this way (as "rare" or "infrequent"). The second implication of the foregoing passage is that when a common symptom becomes worse than usual, it can become a complication. Thus pleurisy that is *unduly* prominent in a case is a complication, whereas pleurisy that is not so prominent is not.

The text continues its consideration of various complications:

The exudation [in empyema (another complication in pneumonia)] may be sero-fibrinous with copious effusion, differing from that of an ordinary acute pleurisy in the greater richness of the fibrin, which may form thick, tenacious, curdy layers... The pneumococcus is usually present; in a few the streptococcus, in which case the prognosis is not so good. ([3], p. 92)

This passage suggests that a clinical finding may become a complication when the finding is not "ordinary." Again, features that make an occurrence unusual may make it a complication—even if no worse symptomatology or no more difficult management is implied.

The text considers two grave cardiac complications of pneumonia, pericarditis and endocarditis. With respect to the former, the text notes:

Pericarditis, one of the most serious of complications, was present in 35 of 658 patients in the Johns Hopkins Hospital... It is often a terminal affair and overlooked. The mortality is very high; 31 of the 35 patients died. ([3], p. 92)

This passage suggests that seriousness is an important attribute of a complication. Meningitis is included as a complication at least in part for this reason as well:

Meningitis is perhaps the most serious complication and varies very much at different times and in different regions... It usually comes on at the height of the fever, and in the majority of the cases is not recognized unless the base [of the brain] is involved, which is not common.

Occurring later in the disease, it is more easily diagnosed. The prognosis is bad; all of our patients died. A few instances of recovery are on record. ([3], p. 93)

That seriousness is a critical trait of a complication that warrants discussion is further supported by the fact that no complication described in this section is termed “minor.” The foregoing passage also suggests that a “bad prognosis” is virtually equivalent to saying that the patient has a high risk of *death*.

The discussion of endocarditis illustrates two further attributes of complications:

The valves of the left side [of the heart] are more frequently attacked [in endocarditis]... There may be *no symptoms* indicative of this complication even in very severe cases. It may, however, be *suspected* in cases (1) in which the fever is protracted and irregular; (2) when signs of septic *mischief* arise, such as chills and sweats; (3) when embolic phenomena appear. The frequent complication of meningitis with the endocarditis of pneumonia gives prominence to the cerebral symptoms in these cases. The physical signs may be *deceptive*. There are instances in which no cardiac murmurs have been heard. ([3], p. 92, emphasis added)

This passage—like the reference above to meningitis often not being recognized—implies that symptoms of a complication need not be present: a “complication” can be asymptomatic or occult. Symptom and signs, in other words, are not necessary to the ontogeny of complications. Since a symptom cannot, by definition, be “asymptomatic,” the attribute of being occult is a key to distinguishing a complication from a symptom. And this feature can make complications difficult and tricky to diagnose, which is reflected in the use of such words as “overlooked,” “unrecognized,” “suspicious,” “puzzling,” “mischievous,” and “deceptive” to describe them [20].

Finally, in describing the complication of arthritis, the text notes:

Arthritis occurred in 5 of 658 cases at the Johns Hopkins Hospital... It may precede the onset, and the pneumonia, possibly with endocarditis and pleurisy, may occur as a complication [of it]. In other instances at the height of the pneumonia one or two joints may become red and sore or after the crisis has occurred pain and swelling may come on in the joints. It is a serious complication as recovery is often slow and a stiff joint may follow. ([3], p. 94)

This passage suggests that pneumonia as a condition may itself be a complication of something else (e.g. arthritis) [21]. Thus, when two conditions occur coincidentally, either of which may, under certain circumstances, be a complication of the other, the one that occurs later is seen as the “complication.” Thus, complications must *follow* the primary disease temporally.

Thus, this section of the chapter on pneumonia in the 1924 edition of the textbook implicitly suggests a number of critical features of a clinical occurrence which oblige the doctor to construe it as a “complication” rather than simply as a “symptom”

or a “variant” of the given disease. A clinical occurrence is a complication of a condition when it follows it in time and when it is (1) infrequent, (2) non-ordinary, (3) serious, or (4) deceptive. Typically, complications have more than one of these features. The most fundamental feature, however, in determining whether a clinical manifestation is a complication is whether it increases the mortality from the condition above its baseline, that is, whether it has *prognostic significance*. Unlike the consideration given to symptoms, where such a linkage is rare, complications are often linked to their impact upon mortality and described with adjectives such as “terminal,” “serious,” or “grave.” This observation is further supported by the explicit deferral of certain findings and symptoms from the section on “Symptoms” to the two other sections, “Complications” and “Prognosis.”

1947 Edition

By 1947, the concept of complications has undergone significant evolution. The section on complications still includes subheadings on specific conditions such as pleurisy, jaundice, meningitis, and arthritis. But it also includes two subsections on “Toxic Reactions as Complications” for penicillin and sulfa drugs [22]. Regarding the latter:

As [sulfa] chemotherapy is so generally used in pneumonia, its toxic effects present themselves to the physician for consideration as possible complications of the disease itself. In fact some of them are similar to disturbances caused by the pneumonia; this often raises the question in differential diagnosis, are we dealing with an effect caused by the toxin of the causative organism or by the toxicity of the therapeutic agents? So it has seemed wise to discuss the toxic manifestation of sulfonamide drugs under the general heading Complications. (See Table on following page.) [The table contains a list of manifestation of drug toxicities for various sulfa drugs, along with their frequency of occurrence.]

Among these toxic reaction are general malaise, anorexia, nausea, vomiting, headache, tinnitus, vertigo, psychoses, cyanosis, anaemia, dyspnea, fever...

Marked hemolytic anemia may develop and is serious, as are leucopenia, agranulocytosis or thrombocytopenia... This is a formidable array, but with caution in dosage [these reactions] can be avoided or minimized. ([4], p. 62–63)

Elsewhere, the text notes that “absence of leucocytosis or a leucopenia is an ominous sign; it may result from the use of a sulfonamide” ([4], p. 53). Complications arising from antibiotic therapy come to be fertile ground for a new aspect of prognostication. Sometimes, drug reactions could be confused not just with the primary symptoms of the disease, as in the foregoing passages, but also with complications of the disease:

A return of the fever, after it has become normal, may be a toxic manifestation of the drug used or be the result of a developing complication, such as empyema. Search must be made for signs of the latter... ([4], p. 72).

It is easy to comprehend the discomfort of the physicians of this period: was the appearance of a symptom (such as fever) or a complication (such as anemia) attributable to the disease or to the drug?

Prior to 1947, an episode of pneumonia was "atypical" or "unusual" if it was marked by complications. But the emergence of chemotherapy demonstrably resulted in a *decrease* in this particular source of atypicality, as the text notes: "Complications have decreased in frequency with the advent of chemotherapy" ([4], p. 59). For example, in the discussion of meningitis, the text states:

The prognosis [in meningitis] is bad, and *few* instances of recovery *were* on record. Modern therapy with the sulfonamides, penicillin and type specific sera has changed this; recoveries now are being reported. ([4], p. 61, emphasis added)

Effective therapy results in a decrease in the old source of atypicality while replacing it with a new source. Chemotherapy supplants complications as the source of atypical trajectories of given illness episodes.

Thus, effective therapy modified prognosis of, and prognostication in, pneumonia in three ways. First, it directly improved the course and outcome of the disease, thus improving its true prognosis. Second, therapy transformed the old bases of prognostication—by enhancing the importance of symptoms and attenuating the importance of complications of the disease itself. And third, therapy provided a new arena for prognostication by causing its own complications.

Summary

Whereas symptoms tended not to have prognostic significance before the emergence of therapy, complications did. Indeed, this was one of the main ways the former were distinguished from the latter. However, the emergence of effective therapy constrained the "natural history" of pneumonia so that most patients' illnesses ran a standard, favorable course, and few patients any longer had a course marked by complications attributable to the disease itself. This development was coincident with the ellipsis of prognosis from the texts, as we shall see. Nevertheless, effective therapy introduced an "unnatural" history with its own set of iatrogenic complications. If therapy effectively obviated the emergence of complications, what basis did physicians have, other than symptoms, for predicting how patients would do?

EXPLICIT PROGNOSTICATION IN LOBAR PNEUMONIA

1892 Edition

The 1892 edition of this textbook, unlike modern textbooks, has a formal section on "Prognosis." It also has two additional sections entitled

"Termination" and "Mortality," which are also formally about the "prognosis" of pneumonia (about the evolution of lung pathophysiology at the end of the acute phase of the disease and about the frequency of death, respectively). Together, the three sections account for 11 percent of the length of the chapter, which is approximately equivalent to the amount of text devoted to etiology, diagnosis, or therapy. The section entitled "Prognosis" begins as follows:

In a disease which carries off one in every four or five of those attacked the prognosis in a large number of cases is necessarily grave. In children and in healthy adults the outlook is good. In the debilitated, in drunkards, and in the aged the chances are against recovery. So fatal is it in the latter class that it has been termed the natural end of the old man. Many circumstances, of course, influence prognosis, particularly the extent of the disease, the height of the fever, the presence of other diseases, and the occurrence of complications. ([2], p. 526)

The first sentence in this passage implies that prognosis is something which is assessed for individual cases, and not something which inheres in the disease itself. The text does not say that the "prognosis is grave in pneumonia" but that the prognosis in "a large number of cases is grave," as if prognosis were case-specific. Indeed, the last sentence of the passage cites a number of case-specific circumstances which affect the prognosis.

The first sentence in the above passage also makes the link between prognosis and mortality explicit, and uses the word "grave" to describe this link. This adjective has roughly the same meaning to this day: a "grave" prognosis means a high risk, if not a certainty, of death. The passage sets the tone for all considerations of prognosis until the 1947 edition of the textbook: prognosis is identified with predicting mortality. The act of prognostication is evidently only minimally concerned with predicting the idiosyncratic *course* of a disease (e.g., the timing of occurrence of events) or with predicting the occurrence of residual morbidity in patients who survive.

The text explicitly enumerates four items as the major determinants of prognosis: extent of disease, fever, co-morbid conditions, and complications. It also alludes to the importance of age, debilitation, and alcoholism. But complications constitute the major axis along which prognosis is determined, as the following passage makes clear:

When a lower lobe on one side or the lower and middle lobes of the right side are involved in a healthy adult, if there are no complications, the case usually proceeds to satisfactory resolution. Meningitis is a fatal complication. Endocarditis is extremely grave, much more so than pericarditis, from which many cases recover. Early signs of heart-failure, dilation of the right chamber, gradual cyanosis, and oedema of the lungs, are symptoms of the most serious character. ([2], p. 526)

The complications of abscess and gangrene also carry prognostic implications:

When there are symptoms of abscess of the lung or of gangrene the prognosis is extremely bad; yet cases are on record of recovery from both these conditions. ([2], p. 526)

Temperature, however, does not appear to play a significant role in prognostication in lobar pneumonia, despite its ubiquity in the consideration of other aspects of this disease, and despite its mention in the introductory paragraph to this section of the text. It is as if fever is so typical of the disease that it is impossible for it to be configured as a complication, such configuration being essential for prognostic significance to be ascribed to a clinical finding.

The emphasis on watching the patient and monitoring for complications is not surprising in light of the knowledge, in 1892, that treatment was limited; the text reflects this:

Pneumonia is a self-limited disease, and runs its course uninfluenced in any way by medicine. It can neither be aborted nor cut short by any known means at our command. Even under the most unfavorable circumstance it will terminate abruptly and naturally, without a dose of medicine having been administered...

We have, then, no specific treatment for pneumonia. In cases of moderate severity a purely expectant plan may be followed—keeping the bowels open, regulating the diet, and, if necessary, giving a Dover's powder at night to procure sleep. In severer cases a symptomatic plan of treatment should be pursued, meeting the indications as they arise. ([2], p. 529–530)

Therapeutic options included phlebotomy, icebag application, dietary regimens, quinine, alcohol, strychnine, ether injections, and morphine. Draining of collections of fluid around the heart and lungs also was practiced. Since little could be done, therapy consisted of “expectant,” watchful waiting. In large measure, physicians watched for events that suggested what the ultimate outcome would be; the focus was on iteratively predicting the outcome of the disease. Even in this setting of watchful waiting, however, most attention was directed at detecting findings that boded ill for the patient rather than those that boded well. The text is much more concerned with bad outcomes.

1924 Edition

In the 1924 edition, prognosis is again largely equivalent to discovering and articulating the determinants of disease mortality and, more generally, disease *outcome* rather than disease *course*. The material on prognosis in the 1924 edition occupies 6.6 percent of the length of the chapter and represents both a relative and absolute decline from the 1892 edition. The section on “Prognosis” opens with the observation that firmly fixes, by virtue of its position, both the gravity of pneumonia and the fact that, in prognostication, understanding and predicting the determinants of mortality is what is at stake:

Pneumonia is one of the most fatal of all acute diseases, outranking even tuberculosis as a cause of death in some

years. In America the mortality appears to be increasing. ([3], p. 98)

Unlike the earlier editions, and reflecting an increasing attention to statistical precision, the text then presents age-specific mortality rates, noting that

Between the ages of 21–30 the mortality is everywhere about 20 per cent; between the ages of 31–40, 30 per cent; and then after each decade it rises, until above the age of 60 more than one-half of the persons attacked die. ([3], p. 98)

The text explicitly identifies five factors which influence the probability of survival: age, habits of life, presence of complications, presence of toxemia, and serological type of *pneumococcus*. This list differs somewhat from 1892. Regarding age, the text states:

...the old are likely to die, the young to recover... From the reports of its fatality in some places, one may say that to die of pneumonia is almost the natural end of old people. ([3], p. 99)

The text continues (regarding “habits of life”):

Individuals debilitated from sickness or poor food, hard drinkers, and that large class of hospital patients, composed of robust-looking laborers between the ages of forty-five and sixty, whose organs show signs of wear and tear, and who have by excesses in alcohol weakened the reserve power, fall an easy prey to the disease. Very few fatal cases occur in robust, healthy adults. ([3], p. 99)

And, regarding complications:

Certain *complications* and terminations are particularly serious. The meningitis of pneumonia is almost always fatal. Endocarditis is extremely grave, more so than pericarditis. Much stress had been laid upon the factor of *leukocytosis* as an element in the prognosis. A very slight or complete absence of leukocytosis is rightly regarded as very unfavorable. ([3], p. 99)

This passage also explicitly links complications with (fatal) terminations.

Finally, prognostication was influenced by specific *diagnostic* capabilities emerging at the time, such as serotyping, bacteriologic analysis, and roentgenology. For example, the specific bacteriology of the complication of empyema had prognostic significance. ([3], p. 92). Moreover, diagnostic procedures were sometimes done specifically to establish prognosis, even when therapy would not be affected. This is illustrated, for example, by the insistence in the text that any confusion between a ruptured lung abscess and straightforward pleural thickening—the former of which carries grave prognostic significance but neither of which was treatable—be resolved “at once” by exploratory needle aspiration or by the use of X-rays. Indeed, this is one of only two mentions of X-rays in this chapter, and it advocates their use for the resolution of a prognostic dilemma. Thus, some physicians in this period were willing to spend time and effort—and to perform risky procedures and laboratory tests—simply in order to establish the prognosis.

In general, the entire section on prognosis is concerned with factors predisposing to death. No mention is made of factors which lead simply to longer bouts of the disease, a more painful course, greater acute debilitation, or greater subsequent morbidity. Indeed, relapse and clinical varieties are considered separately, under different headings, as if these things which represent the *course* of the disease are *not* part of the prognosis proper. One "clinical variety" of pneumonia is that in which there is "delayed resolution":

Clinically, there are several groups of [such] cases: First, those in which the crisis occurs naturally, the temperature falls and remains normal; but the local features persist—well marked flatness with tubular breathing and rales. Resolution may occur very slowly and gradually, taking from two to three weeks. In a second group of cases, the temperature falls by lysis, and with the persistence of the local signs there is slight fever, sometimes sweats and rapid pulse. The condition may persist for three or four weeks and during all this time there may be little or no sputum. The practitioner is naturally much exercised, and he dreads lest tuberculosis should supervene. In a third group the crisis occurs or the fever falls by lysis; but the consolidation persists, and there may be intense bronchial breathing, with few or no rales, or the fever may recur and the patient may die exhausted. ([3], p. 97–98)

Once again, attention to variations in temperature is the fundamental basis for drawing distinctions; however, temperature is more important for assessing the clinical *course* than for predicting mortality. That is, predicting death and clinical course are distinct tasks in this edition; whereas symptoms (in particular, fever) are important for assessing the course, complications are once again important for assessing the prognosis. More generally, prognostication as such is restricted to a particular kind of outcome, namely death, to the exclusion of other clinical outcomes.

Therapy in 1924 is not much different from 1892, with the notable exception of the introduction of anti-pneumococcal serum. Treatment is supportive, with emphasis on patient comfort, diet, "good nursing," and bowel regimen. The text still advocates phlebotomy in certain circumstances, along with hydrotherapy, narcotic analgesia, and various pharmacological measures designed to "support the circulation."

1947 Edition

The section on "Prognosis" in the 1947 edition reflects the radical change engendered by the emergence of antibiotics:

Pneumonia has been one of the most fatal of all acute diseases. Mortality varied greatly in different years. It is higher in hospital than in private practice; higher in the poor than in the well-to-do; higher in the very young and in the old than in the middle years; higher in alcoholics than in the temperate; higher in the obese than in those of average weight but not higher in the thin unless they have some chronic disease; higher in the bacteremic patients and in those with complications and chronic disease; higher when more than one lobe of the lung is involved;

higher when there is leucopenia; higher when there are many pneumococci in sputum coughed from the lungs; modern therapy with abiotic [sic] drugs has bettered prognosis very greatly. ([4], p. 63)

By "bettered prognosis," the text means specifically a decrease in mortality. The text cites statistics that track the decline in mortality with the introduction of antibiotics:

At the Johns Hopkins Hospital in Baltimore and the Massachusetts General and Peter Bent Brigham Hospitals in Boston mortality in pneumonia cases, probably in large part pneumococcal, over a long period of time has varied in individual years from 20 to 35 per cent with an average annual mortality of about 25 per cent. With the advent of serum therapy these figures began to fall and with the use of sulfonamides have fallen still more; with penicillin further fall will occur. The mortality from pneumococcal pneumonia in recent years at these hospitals were as follows: at Johns Hopkins Hospital in 1938–39, 7.2 per cent, in 1939–40, 7.9 per cent, in 1940–41, 10.5 per cent... These figures vary, as they do, probably because the number of pneumococcus cases in these years is not large. They indicate a great betterment under modern methods of treatment in the prognosis of pneumococcal pneumonia. ([4], p. 64–65)

Consistent with the decline in mortality, the space devoted to prognosis in the chapter declined still more from the 1924 edition, both absolutely and relatively, to 65 lines and 4.1 percent of the text.

The 1947 edition identifies a number of factors relevant to the prognosis in pneumonia, including the "[sero]type of the infecting pneumococcus," the patient's age, and the patient's economic status. It also makes the following observations about the importance of certain symptoms and signs:

Toxemia and anoxemia are important prognostic features, to which in a majority of cases the degree of pyrexia and the extent of consolidation are entirely subsidiary. Marked nervous symptoms, dilatation of the heart, a pulse rate persistently above 125, low blood pressure, marked cyanosis, edema of the lungs, meteorism, scanty secretion of urine, and severe exhaustion are unfavorable signs. With multilobar involvement the mortality is enhanced. ([4], p. 65)

Thus, as we have previously seen, symptoms in 1947 are explicitly linked to prognosis and to survival.

Finally, the 1947 text describes (for the first time) a method of counting pneumococci in the sputum under the microscope. This method is described as a "very trustworthy prognostic index" ([4], p. 65), providing a mechanism by which to place patients in the appropriate prognostic category (with categories having 2%, 9%, 30%, and 77% mortality, respectively).

Summary

Prognosis is equated with mortality in all editions of this textbook. However, the basis for prognostication undergoes a shift during the period between 1892 and 1947. While complications are critical to the determination of a prognosis in the early part of this period, symptoms and lab tests (such as X-rays,

serotyping, and bacterial culture) become essential for assessing the prognosis by 1947.

THE ELLIPSIS OF PROGNOSIS

Qualitative examination of the texts from the earlier part of this century thus reveals that, unlike current practice and textbooks, prognosis was an important part of the clinical formulation of patients' cases. It remained so until the discovery of antibiotics. However, the texts reveal that the progressive decline in the mortality of pneumonia in response to therapy was associated with a decline in the prominence of prognostication in the clinical management of this disease. The underlying basis for formulating a patient's prognosis also changed over time. Initially, (deadly) complications are determinative; later, symptoms are key; still later, the use of antibiotics and the performance of specific prognostic tests become crucial. As complications become less frequent and less severe, their utility as prognostic indicators declines. Conversely, many symptoms—previously considered to be intrinsic, and prognostically irrelevant, parts of the disease—assume greater significance in an era when they are expected to be prevented by the application of antibiotic therapy.

Ultimately, however, the prognosis of pneumonia improved so much that it became *assumed* and, consequently, neglected. But this development alone is

insufficient to explain the ellipsis of prognosis. The diminution of prognosis also reflects a broad change in emphasis in clinical management, away from prediction and toward treatment. Physicians found a new way to meet their obligation to *control* disease. This obligation, and the relationship between prognosis and therapy, was aptly captured by one eminent physician in the late 1800's who observed that "the public ... expect something more of physicians than the power of distinguishing diseases and of predicting their issue. They look to them for the relief of their sufferings, and the cure or removal of their complaints" [23]. This passage, incidentally, reveals both how assumed the function of prognosis was at this time and also helps to explain why prognosis should recede from salience with the emergence of ways to "relieve sufferings."

The changes in attention given to various clinical tasks during the period under consideration are illustrated quantitatively in Figs 1 and 2. The data presented in these figures show the relative attention, in terms of proportion of chapter length, devoted to different aspects of the clinical management of pneumonia in various editions of the textbook [24]. The figures show the proportion of the chapter devoted to each of seven topics: (1) etiology, (2) presentation (including signs and symptoms), (3) pathology, (4) diagnosis, (5) therapy, (6) prognosis, and (7) complications.

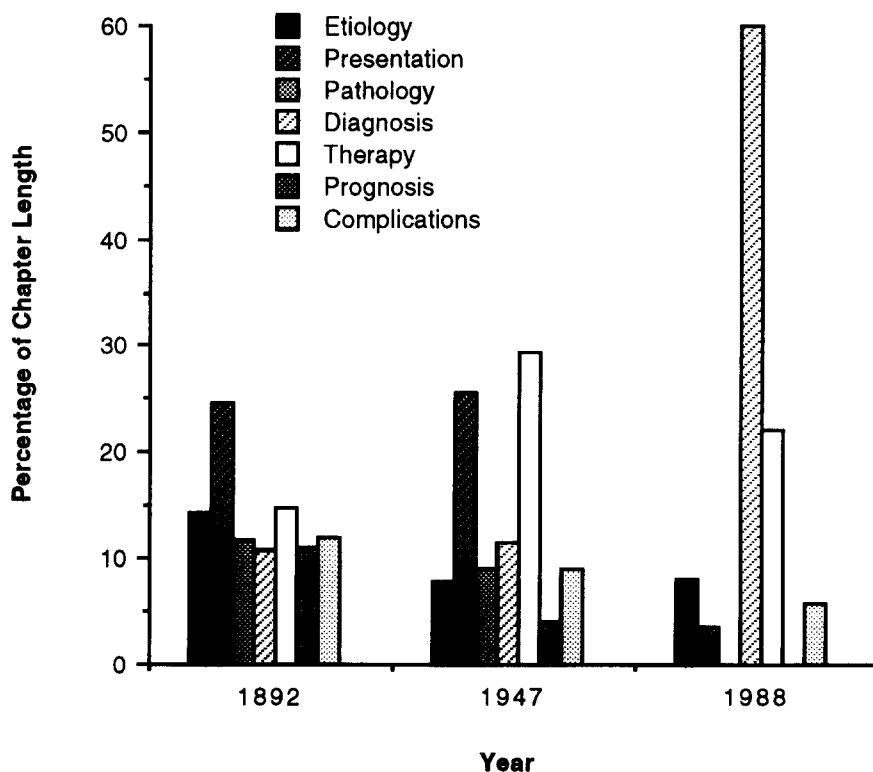


Fig. 1. Proportion of chapter length devoted to seven clinical tasks in 1892, 1947, and 1988

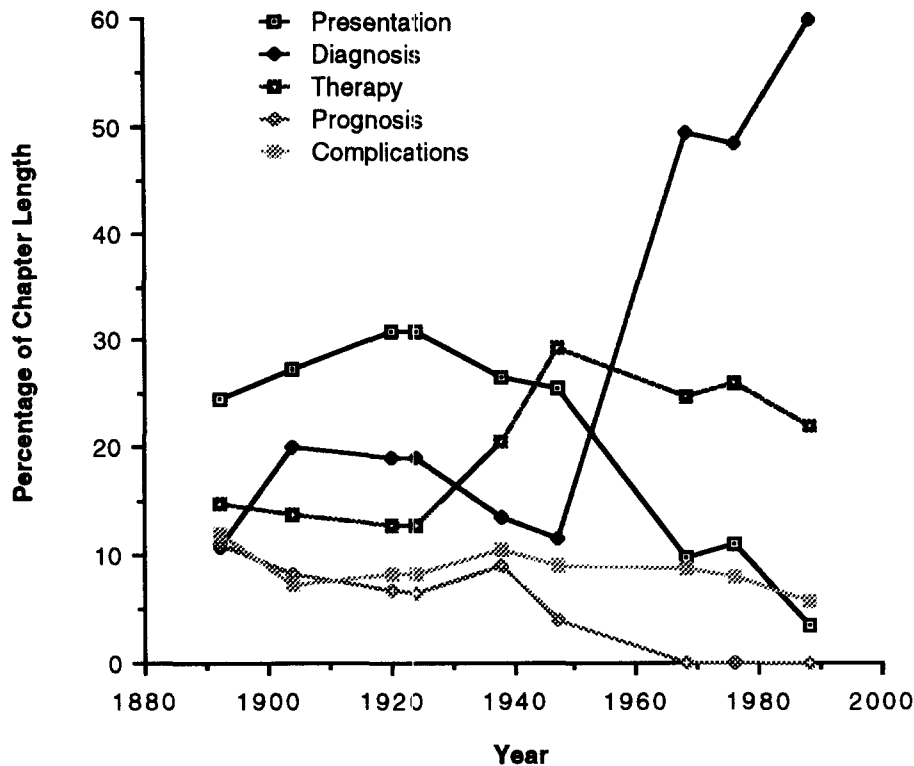


Fig. 2. Change in proportion of chapter length devoted to selected clinical tasks between 1892 and 1988

Fig. 1 shows these proportions for the 1892, 1947, and 1988 chapters. The 1892 chapter gives more attention to the presentation of the disease than to anything else, while the other six topics receive roughly equal attention. Specifically, the material on prognosis is about as long as that on diagnosis and therapy. By comparison, the majority of the chapter in 1988 is devoted to diagnosis, and there is no explicit discussion of prognosis at all. The latter proportions are relatively typical of modern textbook entries [25]. The 1947 entry is intermediate between 1892 and 1988; it shows the increase in attention to therapy and the decrease in attention to prognosis.

This change in the relative emphasis given to prognosis occurred in conjunction with the emergence of effective treatment for pneumonia in the late 1930s. Fig. 2 illustrates this chronological process. Data on five selected topics in editions published roughly every 10 years are shown [26]. Several points are apparent from the graph. First, there has been a relatively consistent decline in the amount of explicit coverage of prognosis, with modern textbooks having no coverage of the topic. Second, the attention devoted to therapy and diagnosis has generally increased. Third, there is a slight upward deflection in the attention given to prognosis in 1938: when antibiotics are first discussed, the text begins to give attention to the prognosis of iatrogenic complications, as we have seen. In gen-

eral, however, prognosis disappears as diagnosis and therapy gain prominence.

This quantitative analysis thus supports the qualitative analysis. It is important, however, not to make too much of the numerical assessment because at least two other factors may account, at least in part, for the proportions of different editions of this textbook devoted to different aspects of pneumonia. First is the issue of the intended audience of the textbooks. Whereas in 1892 the textbook was intended for students, houseofficers, and practicing physicians, by 1988, the textbook was primarily directed at students and houseofficers. As such, we might expect the later textbook to emphasize diagnosis to a greater extent. Second, the textbooks of the two periods were released into different markets. In 1892, there were relatively few independent pathology, microbiology, or pharmacology textbooks, for example. However, by 1988, there were many texts on a wide variety of such subjects; in 1988, there was no need for a general textbook of medicine to cover pathology, for example, and this may partly explain the ellipsis of pathology seen in Fig. 1. Nevertheless, despite these differences in audience and market, the ellipsis of prognosis could not be attributed to these factors alone. Certainly there is no separate discipline or separate textbook (as such) devoted to prognosis. And, indeed, much of the audience for the textbook did remain fixed across time. Most important, the change in the many

qualitative aspects of prognosis discussed above cannot be explained by such changes in audience or market.

PROGNOSIS AND ATYPICALITY

In the pre-Oslerian era, the course and outcome of a disease were believed to be largely directed by the "constitution" of the patient. If two individuals were exposed to a contagious ailment, the one who had a "firmer" constitution would have a more favorable outcome. The prognoses of the two individuals would differ on the basis of individual factors distinct from the diagnosis itself. The two individuals would, in some sense, have different diseases. But by the Oslerian era, physicians began to believe that two different patients might have—in a fundamental sense—the *same disease*. The initial editions of Osler's textbooks were released during a transition period wherein medicine moved from an individualistic notion of disease to one concerned with the centrality of diagnostic categories based on specific causative agents. This development in clinical thought was associated with a substantial increase in attention to making diagnoses—of conditions believed to have identities independent of their existence in a given patient—and with a decrease in attention to the role of patient-specific factors, whether occupation, age, sex, or symptoms.

By the time Osler was writing the first edition of his textbook, in other words, a cognitive shift toward the notion that disease had a discrete existence that was not only ontological and etiologic, but also prognostic—that a disease had a "natural course" that was "typical"—had in fact already begun. A corollary of this development was that it made it possible for certain features and outcomes of a patient's disease to be defined as "atypical." This raised problems of interpretation and of meaning for physicians. How were atypical occurrences to be handled? This problem was magnified when the advent of manifestly efficacious therapy standardized the expression of disease in patients, giving it a generally uniform and favorable outcome. Effective therapy further conflated diagnosis and prognosis, so much so that, by the present, there has been an ellipsis of prognosis. Prognosis is viewed as a simple extension of diagnosis, an extension typically not necessitating explicit consideration.

Nosologic systems and effective therapy both work to shift clinical attention from individual patient to diagnostic category. The emphasis in the clinical encounter is now on making a diagnosis and instituting therapy. Attention is directed to what is deemed to be the essence of the patient's problem, and this leads to a clinical view that is *through* rather than *upon* the individual case. The patient becomes "not so much a sick person as [an] endlessly reproducible pathologic fact" [27].

The problems and opportunities raised by atypically expressed disease are suggested by the dichotomy between "typical" and "atypical." Whereas typical cases are seen as straightforward, certain, predictable, and generic, atypical cases are complicated, uncertain, unpredictable, and individual. Whereas typical cases suggest knowledge, competence, and power on the part of the physician, atypical cases raise the fear of ignorance, incompetence and impotence. Whereas prognosis is presumed in typical cases, it must be addressed in atypical cases. Indeed, prognostication is paradoxically both confounded and supported by atypicality. On the one hand, atypicality suggests deviation from the prognosis inherent in the diagnosis and therapy. On the other hand, atypicality provides the substrate for a physician to formulate a specific prognosis.

Especially when effective therapy exists, the atypical case is a threat both to the health of the patient and to the reputation of the physician. The latter threat arises from the social role assumed by physicians. Technical advances and discoveries since the turn of the century have held such promise that society has endowed physicians with the duty and the privilege to eradicate disease. From this triumphalist perspective, death connotes failure—not just of the therapeutic armamentarium to achieve its objective, but also of the physician to fulfill his or her social role. Distinguishing manageable from unmanageable cases by means of prognosis is thus a crucial task for the physician who wants to avoid unmanageable cases and appear competent. When effective therapy provides a relatively fail-safe means by which to fulfill this social role, prognostication diminishes in importance.

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17. Note that in ranking symptoms in terms of their "gravity," one might rely on how bothersome they were to the patient, how difficult they were to control, or how adversely they affected the patient's prognosis. It is noteworthy that the last option does *not* play a significant role.
18. Osler, W. (1897) On certain features in the prognosis of pneumonia. *Am. J. Med. Sci.* 1-9.
19. The 16 entities (with the description of their frequency, if any) are as follows: pleurisy, empyema ("most common"), pericarditis, endocarditis, peripheral vein thrombosis ("uncommon"), ante-mortem intracardiac coagulation ("very rare"), arterial embolism ("rare"), meningitis, peripheral neuritis ("rare"), gastric complications ("rare"), peritonitis ("rare"), meteorism ("not infrequent"), jaundice, parotitis, nephritis ("not often seen"), and arthritis. Empyema occurred in fewer than 2.2% of cases, according to the text; the rest of these complications thus necessarily had even lower incidences.
20. Many of these words have animistic overtones and carry connotations of the game-like relationship between the physician and the signs of disease as he or she goes about the work of diagnosis, treatment, and prognosis—a "game" in which the disease itself may not "play" according to the "rules" at all times. In a sense, the disease is "cheating" by becoming occult (or, indeed, non-local). An atypical presentation, in a part of the body other than the lung, is "unfair" and represents a form of concealment. In the era of effective therapy, as we shall see, the expectation that the disease will "play by the rules" is all the more palpable. Disease is expected reliably to yield to therapy: when it does not, it is violating expectations.
21. It is noteworthy that arthritis typically does not involve death. This is a singular example of a complication not linked to mortality. However, this exception appears to "prove the rule" since arthritis is deemed so serious that it is treated as if it were as serious as death. In 1924, of course, "arthritis" from a bacterial infection often resulted in a fused and useless joint, and may have threatened the livelihood, if not the life, of the patient.
22. Although the text discusses sulfa drugs, in point of fact, by 1947, penicillin had largely, if not completely, supplanted them; this discrepancy can be attributed to the lag in publication of textbooks mentioned above.
23. Bigelow, J. (1858) *Brief Expositions of Rational Medicine, to Which is Prefixed the Paradise of Doctors*, p. iv. Phillips, Sampson and Co, Boston.
24. The approximate absolute lengths of three of the chapters are as follows: 1892, 12,670 words; 1947, 22,260 words; 1988, 11,780 words.
25. The relative salience of prognosis in the "pre-modern" textbooks is illustrated not only by the amount of text devoted to the topic, but also by the fact that the section on prognosis actually *precedes* the sections on diagnosis and therapy.
26. The 21-year gap between the 1947 and 1968 entries is explained by the absence of any new editions of the textbook in this period.
27. Foucault, M. (1975) *The Birth of the Clinic: An Archaeology of Medical Perception*, p. 97. Vintage Books, New York.