Body Counts

Medical Quantification in Historical and Sociological Perspective / La quantification medicale, perspectives historiques et sociologiques

EDITED BY
GÉRARD JORLAND, ANNICK OPINEL,
AND GEORGE WEISZ

Published for / publié pour
Fondation merieux

by / par

McGill-Queen's University Press
Montreal & Kingston • London • Ithaca

ISBN 0-7735-2829-6 (cloth)
ISBN 0-7735-2925-X (paper)

Legal deposit second quarter 2005
Bibliothèque nationale du Québec

Printed in Canada on acid-free paper that is 100% ancient forest free (100% post-consumer recycled), processed chlorine free.

McGill-Queen's University Press acknowledges the support of the Canada Council for the Arts for its publishing program. It also acknowledges the financial support of the Government of Canada through the Book Publishing Industry Development Program (BPIDP) for its publishing activities.

Library and Archives Canada Cataloguing in Publication

Body counts : medical quantification in historical and sociological perspective = la quantification médicale, perspectives historiques et sociologiques / edited by Gérard Jorland, Annick Opinel and George Weisz.

Text in English and French.
Proceedings of the symposium La quantification dans les sciences médicales et de la santé: perspective historique, held at Musée Claude-Bernard, in Saint-Julien-en-Beaujolais, France, Oct. 24–26, 2002.
Includes index.
ISBN 0-7735-2829-6 (bound).—ISBN 0-7735-2925-X (pbk.)

1. Medical statistics—History—Congresses. 2. Epidemiology—Statistical methods—History—Congresses. 3. Medical instruments and apparatus—History—Congresses. I. Jorland, Gérard II. Opinel, Annick III. Weisz, George IV. Fondation Marcel-Mérieux V. Title: Quantification médicale, perspectives historiques et sociologiques.

RA407.B62 2005 610'.9 C2004-906136-4E

Catalogage avant publication de Bibliothèque et Archives Canada

Body counts : medical quantification in historical and sociological perspective = la quantification médicale, perspectives historiques et sociologiques / edited by Gérard Jorland, Annick Opinel and George Weisz.

Textes en anglais et en français.
Compte-rendu du symposium La quantification dans les sciences médicales et de la santé: perspective historique, présentée au Musée Claude-Bernard, in Saint-Julien-en-Beaujolais, France, Oct. 24–26, 2002.
Comprend un index.
ISBN 0-7735-2829-6 (relié).—ISBN 0-7735-2925-X (br.)

1. Statistique médicale—Histoire—Congrès. 2. Épidémiologie—Méthodes statistiques—Histoire—Congrès. 3. Médicine—Appareils et instruments—Histoire—Congrès. I. Jorland, Gérard II. Opinel, Annick III. Weisz, George IV. Fondation Marcel-Mérieux V. Titre: Quantification médicale, perspectives historiques et sociologiques.

RA407.B62 2005 610'.9 C2004-906136-4F

Typeset in 10/12 Baskerville by True to Type

6

Standardizing Body Temperature: Quantification in Hospitals and Daily Life, 1850–1900

VOLKER HESS

One of the first quantifying techniques in medicine, the thermometer, entered hospitals only in the mid-nineteenth century and found its way from there into everyday life at the end of the century.[1] Fever measurement was thus the first instrumental technique to incorporate the principles of modern medicine in three respects. First, the measurement translated traditional modes of judgment based on assessing the tactual heat or the patient's feelings into an abstract number. Second, by defining the normal ranges of a physiological function, the data distinguished between the healthy and the sick in a way that became characteristic of the quantifying approach of modern medicine.[2] Third, by discretely demarcating borderlines, fever measurement established a new way of dealing with illness inside and outside of the hospital.[3] In a sense, body temperature became standardized in triplicate – as a procedure for measurement, as biological nature, and as a social value.

It is not my intention, however, to recount this story in the epistemological framework of Canguilhem or as part of a normalizing discourse à la Foucault.[4] Instead, I concentrate on the practices through which quantitative methods were established and deployed in the hospital and in daily life. I wish to demonstrate that the instrumental quantification of morbid states took on very different meanings that we cannot understand simply in terms of Foucault's concept of normalization. Normalization is often too easily attributed to the intrinsic effects of measurement and the quantitative appropriation of the individual. By contrast, I intend to show for the German case that, in order

to account for the complexity of historical processes, one must distinguish between different stages in the standardization of instruments and measurement practices on the one hand and Foucault's normalization on the other.

Hence, I first consider the standardization of measurement practices. Then I analyse the objectivity of the body subjected to those practices and their meanings for the patients. Finally, I look at technical standardization in terms of the introduction of fever measurement in day-to-day practice, emphasizing the social recognition and stabilization implied in instrumental quantification.

STANDARDIZING THE PRACTICE OF MEASUREMENT

Replacing qualitative thinking was the first step in standardization. Although there were – even by modern standards – reliable thermometers dating back to the late seventeenth century,[5] physicians and scientists remained sceptical well into the mid-nineteenth century as to whether the thermometer recorded the natural heat of life or the unnatural warmth of fever.[6] At the turn of the seventeenth century, the orderly measurements that Anton de Haen (1704–1776) had taken in the Vienna Citizen Hospital seemed to contradict Hippocratic doctrine. As one contemporary remarked, "de Haen was certainly able to observe sensitive heat – without inborn heat necessarily being likewise constituted."[7] Today, we can barely imagine the qualitative diversity once involved in distinguishing a caustic, dry, or burning heat – to say nothing of a so called cold fever. This wealth of heat qualities disappeared through the introduction of instrumental measurement, which translated the subjective experience of illness into the visible extension of a mercury column and thereby reduced the sensory qualities to the discrete quantities that one could read from a scale.

Medical historiography has often portrayed objectifying quantification as an inevitable consequence of scientific measurement.[8] Indeed, mid-nineteenth-century thermometry first gained a foothold in the hospital as part of the scientific turn of medicine, when clinicians tried hard to mimic the laboratory methods and disciplinary identity of contemporary physiology. The transformation of hospitals from social asylums into institutions of medical care provided ample space for such efforts. In large city hospitals, such as those in Berlin or Leipzig, clinicians managed within a few years to determine the 'normal range' of human body temperature. One of them was Carl August Wunderlich (1815–1877), the professor of the internal ward in Leipzig. In 1868, having taken the temperatures of thousands of patients and accumu-

lated reams of data in less than ten years, he proudly published the "fundamental rules" in fever diseases based on the behaviour of inner heat.[9]

However, neither Wunderlich nor his colleagues justified their definitions of physiological norms. Nor did nineteenth-century clinicians pay much heed to statistics (in the narrow sense) and calculations of the distribution or the standard deviation.[10] As long as the data were obtained using scientific measurement techniques they were taken to offer an objective representation of the state of the human body.

But this historiographical perspective neglects the "normalization" of fever measurement in hospitals. It appears as though measurement merely brought hidden nature to light. That was why biological norms – unlike other social or technical norms – expressed in the form of normal values seemed particularly sacrosanct. In the case of body temperature, however, this biological nature of the normal range was a very artificial product. The reproduction of measurements independent of place, time, and measurer was not as simple as we might think in today's world of digital and ear thermometers. The classic minute maximum thermometer emerged only after establishment of the new method.[11] Without it, surveying body temperature was an extremely laborious and time-consuming venture that often lasted more than half an hour. Taking scientific – i.e., systematic – measurements involved not fitting the instrument to the patient, but vice versa. The Berlin clinician Ludwig Traube (1818–1876) first described this management of the patient's body in 1851 and called it the "method of measurement":[12]

> First of all the patient is placed as horizontally as possible on his back … The arm is then brought toward the trunk so that it rests as tightly as possible along the length of the trunk. As soon as it touches the trunk, it is bent to a right angle at the elbow and the lower arm is passed by the thermometer and placed on the stomach. The upper arm, which now rests tightly on the trunk is then fixed in this position with a chaff-pillow, which is pressed against the arm horizontally by means of a nearby heavy object, such as a chair. After ten minutes the level of the mercury column is recorded and from then on every five minutes, until the column finally remains at a constant height for a period of five minutes. Usually this will be the case only after a period of 25 to 35 minutes, occasionally even longer. One of the main ways to ensure that a constant level is reached quickly is doubtless the careful closure of the armpit.

In effect, patients participated in producing an objective representation of their biological 'nature.' The choreography of this new body technique[13] depended on patients who practised and learned

such sequences of controlled movement. The disciplined posture thereby made possible the controlled and reducible measurements. In turn, these measurements shaped the 'normal' ranges. One may ask why hospital patients were willing to offer up their bodies to these ends. Why did they willingly adapt themselves in such a manner so as to guarantee the necessary fit between themselves and the instrument? Why did they subject themselves to this procedure of measurement? Why did they offer their body to the curiosity of the physician? And what benefit did they derive from the objectification of their bodies? In order to answer these questions, we must first look at the historical background of the hospitals in which this body technique of temperature measurement arose.

THE BODY'S OBJECTIVITY

For a long time, the German hospital was primarily a coercive institution for poor relief. In recent years, however, empirical studies have uncovered important nineteenth-century developments.[14] By the first half of the nineteenth century, the growing proportion of insured patients had already transformed the traditional poor house into an institution of medical treatment,[15] while poor patients shifted to complementary forms of ambulant care.[16] The hospital clientele came increasingly from the lower class, especially the 'labouring poor.' In the Charité Hospital in Berlin, the proportion of so-called self-payers increased from 30 per cent in 1834 to 70 per cent in 1868.[17] These people had to pay for health insurance through workers' unions or hospital subscriptions, and they came to consider hospitalization not as an arbitrary act of mercy or bountiful philanthropy, but rather as a service purchased by their own contributions.

Academic physicians had little interest in hospitals before the early nineteenth century because of their orientation towards traditional bedside treatment.[18] Although the social transformation of hospitals gave them access to very interesting acute 'patient material,' it also presented them with a new type of patient they considered unworthy of their attention. And those patients had expectations and claims that physicians were ill prepared to handle. The contrast between the new clinical practice and traditional bedside treatment could hardly have been greater.[19] In traditional medicine, patients and physicians hailed from the same socioeconomic class and shared the same conceptions of the world and of themselves, as well as a common concern for the human body and the civic ideals of a healthy life and regular behaviour. In hospitals, however, patients were not civic patrons who honoured the physician, but instead workers, journeymen, or menial labourers with room and board paid for by insurance companies.

While the structure of the traditional consultation aimed at helping patients to cope meaningfully with their disease experience, the primary interest of hospitalized patients could well be the rapid restoration of fitness to work. In the eighteenth century, examination of patients was the essential element in the interaction that excavated subtle perceptions and hidden feelings.[20] In the nineteenth-century hospital, however, the patient's voice became useless to the physician. As a widespread handbook of clinical medicine remarked, the patient's "descriptions usually concern only various feelings, combined with speculations about the origin of the illness. If the patients are able to relate the temporal course of their complaints, one can learn something about the actual condition of their bodies from these rather confused reports. One must learn to understand the vernacular and to translate these vague reports into the language of medical reality."[21]

The academic arrogance and social alienation associated with this viewpoint are unmistakable. The educated doctor and the uneducated, proletarian hospital patient hailed from different social worlds no personally negotiated discourse about complaints and sickness could bridge. For the doctor at the bedside and for clinical scientists in general, hospital patients remained largely mute. Their speech seemed vague, confused, and full of sensations – in a word, subjective. But this judgment involved more than simply social exclusion. It points to the central function of objectifying measurement in the doctor–patient relationship. The rules of traditional bedside medicine never governed hospital patients, because they were never able to participate in the learned and enlightened discourse that characterized examination in private practice. While measurement could not alter a patient's social standing, it did replace muted speech with a technology that granted the body an 'objective voice.' This objective body, brought into the hospital by the voiceless, lower-class patient, now comprised the language of medical reality. The objective measurements configured the body as the object of reference in the interaction between doctor and patient.

One can suppose that patients were well aware of the problems of communication. Because verbalization was insufficient to communicate illness and its severity, measurement also offered patients a form of communication based on the objective language of their bodies. If Wunderlich, as I have suggested, spent more time on his rounds visiting the fever curves rather than the patients themselves,[22] then the *bon mot* seems not as farfetched as its author may have intended; the well-drawn curve was perhaps more communicative than any story told by a case history.

The objective body, which spoke in an obvious, exact, and undeniable manner, superceded the eloquent patient. And the sense and meaning of illness emerged not in enlightened conversation, but through negotiation in a practice, which actively involved patients in fitting themselves to the instrument. For the patient, the objective body comprised not only the means and basis of the interaction, but also the reference point from which to derive the illness's meaning.

The sole verbal statements about this communicative function came from physicians. For example, the clinician Felix Niemeyer confessed publicly in 1869 that he would "often hide the body temperature from hospital patients for reasons of humanity, because the patients had learned *first hand* that high temperatures decreased their prospects of recovery."[23] In this way, the bodies' objectivity, articulated in measurable numbers, opened up new forms of perception and experience that patients too shared.

However, the patients imposed their body's objectivity not only in the course of ward rounds. The body became the object of all medical interest. Hospital staff pondered, cleansed, nursed, and fed it – and in the 1860s, its recovery was a question no longer of subjective well-being, but of quantifying practices such as daily weight control. In the records of the Leipzig hospital, one can find the case of a young craftsman, whose "status was, much improved … after a treatment of six weeks, the appetite and all functions [were] good, liveliness fully returned and weight had increased at first slowly, then more quickly."[24] As the reports on weight control over the next ten weeks prior to discharge indicate, the objectified body remained the reference point for doctor–patient interaction.

As the complaints of the Leipzig city fathers demonstrate, the new form of care was not simply the side effect of a new clinical treatment. Concerned about rising costs, they noticed that disbursement for patients' food was increasing in comparison with other costs – despite the falling price of bread. Analysing the details showed the reason for the cost increase: physicians had ordered more and more special rations instead of the regular meatless food.[25] The hospital rightly boasted about its food and catering, and it "did everything the physicians deemed necessary without protest or delay."[26] And some patients even mentioned in their autobiographies that they had spent the "best time" of their lives in hospital.[27]

It would be wrong to explain patients' conduct simply as a response to the 'reward system' of institutionalized care. This would ignore the expectations and claims brought about by the transformed hospital. Patients usually received back the costs of the hospital stay, but sick pay rarely compensated for lost wages. Each hospitalization meant a loss of

income and required individuals to weigh the conflicting interests of medical treatment and financial security. Thus the patient might feel even better 'understood' by an interaction based on the moral economy of the objective body.

Clinical measurement did not simply *translate* physical distress and need into medical language. It *reduced* them as well to 'purely medical' phenomena. Hospitals could hardly be expected to be able to treat the 'proletarian disease' and misery but they could deal with the abnormal heat or excessively low weight of an objective body. Quantifications might also operationalize needs and demands from the patients' perspective in a way that fulfilled their expectations of good care and treatment because they resulted in an immediate action. The scales measured physical need as "underweight" and translated it into a therapeutic diet. And the thermometer inscribed physical illness into readable fever curves and rewrote it in the form of therapeutic concepts. The clinical quantifications not only endowed patients with bodies of therapeutic relevance, but also freed them from all family needs, doubts, and justifications by recognizing only 'objective facts.'[28]

In the second half of the nineteenth century, the objective body acquired a value of its own in three respects. First, medical practices such as measuring temperature or weight became entirely adequate body techniques from the patient's point of view because they combined into a meaningful relationship their own worries about the sick body and physicians' specialized knowledge and interests. Not only did quantification meet the expectations placed in medical expertise and competence, but it also assured that the situative and adequate application of that expertise would depend on patients' body techniques.[29] Hence, body training in the regular procedure of measurement ensured the controlled and regulated application of the medical power that new forms of knowledge production had generated.

Second, clinical quantification configured the objective body as a social point of reference. One may today mourn the fact that the patient's subjective speech does not receive due consideration; but in the historical context of the nineteenth century, minimizing doctor–patient communication might have offered a chance to compensate somewhat for pre-existing social inequalities in the treatment situation. Furthermore, the enlightenment discourse about "excavating" subtle perceptions and hidden feelings turned out to be extremely fuzzy and subjective and was ultimately disavowed and condemned as unscientific. The practice of quantification made the bodies of lower-class patients both scientifically objective and socially normal.[30]

Third, debates have arisen in the context of cultural history. Scholars have emphasized that the often-obsessive self-observation so characteristic of the enlightened discourse of bedside medicine served to facilitate an understanding and an internalization of the values of scientific objectivity and social normality. These values distinguished bodies of the bourgeois from those of the nobility and the lower classes. The fragile nature of bourgeois bodies – corresponding to their delicate social status – required diligent observation, careful control of internal motions, and constant concern about harmful influences.[31] If examination of patients had once centred on body care, on which the aspiring middle class had based its hegemony, then what was the meaning of measured and objectified hospital bodies? Quantification also established a conscious and controlled interaction with the body. The precision of the measurement was based on the precision of the body. Only control could subject its physical nature to scientific objectification and deem it 'normal.' Ultimately, over the course of the nineteenth century, this body's scientific qualities and meanings became generally normative. Its objectivity also legitimated claims to political and social equality at a time when the hierarchically divided class society was changing into a complex and functionally arranged industrial society. In this context, quantifying measurement established a point of social reference beyond the economic and social class divide.[32]

TECHNICAL STANDARDIZATION

Real standardization of body temperature began when fever measuring gained general acceptance. At the end of the nineteenth century, 'normal ranges' of temperature embedded themselves in the daily life experience of illness as measuring instruments entered into the private household. If we can believe contemporary physicians, faith that temperature measurement could distinguish between morbidity and health greatly facilitated this process. Furthermore, in private practice the sick person had quickly learned to derive "reassurance from the temperature measurement." As Wunderlich proudly pronounced, it had become "customary that patients, asked how they felt, answered by stating their temperature."[33] Laypersons also soon measured themselves.

And to the extent that patients began to verify their actual well-being with instruments, the physiologically defined normal temperature acquired a normative meaning, which it had not previously had in the laboratory or hospital. One remarkable episode appears in Jens Lachmund and Gunnar Stollberg's recent study of patients' autobi-

ographies. Lilly Braun (1865–1916), socialist and feminist, noted in her diary about 1900: "I was so weak and scorching! I crept to the bedroom with my last ounce of strength and place a fever thermometer under the arm: 39½ [degrees Celsius] – I called for Berta and sent for the doctor."[34] But aligning the subjective experience of illness with measurable normality does not fully explain why a normative definition of health entered daily life. What led ill persons to view this alignment as self-evident? And why did they trust the measured quantities? An initial clue surfaces in gauging and calibrating of thermometers – practices that opened the way for the instrument to move into daily life.

From the late eighteenth century on, the calibration of thermometers had posed no serious problems. In contrast to measuring lengths and volumes, temperature scales related to the physical properties of water – and these were easy to reproduce everywhere as long as one accounted for air pressure. Consequently, nineteenth-century clinicians could and had to gauge their own instruments. All the instruments were employed, even if "the manufacturer's calibration was incorrect." Only the "uniform calibration" of the scale, which could be "carefully compared with a normal-thermometer," was important.[35] Usually each hospital had one or two so-called normal thermometers with which people matched the clinical instruments. Such local standardization turned out to be sufficient for limited application within hospitals. Outside, however, accuracy at a personal level required specifying the manufacturer of the instruments and the clinician conducting the readings. This seemed to be sufficient for the dissemination of fever measurement as clinical practice.

Until the early twentieth century, states did not base efforts to calibrate thermometers on public health or hygiene policy; instead, they responded to issues relating to industrial production and trade. The official certificates granted by the Imperial Physical-Technical Institute (Physikalisch-Technische Reichsanstalt) attested to the quality of manufacturers' products as tested by an independent, scientific agency and thereby promoted sales.[36] The technical standardization of the fever thermometer was part of the processes of industrial competition, whereby strict standards could help ensure transparent construction, function, and material quality. Official certification – on paper or etched on the glass tube – vouched for the instrument's integrity.

Implementing technical standardization in the medical world of hospitals also had important social components. This we can see in the reports that the Prussian ministry of culture requested from the medical administration districts in 1907.[37] At first, the ministry wanted to

know the benefits that use of officially certified thermometers had brought to public hospitals. Second, it was keen to find out what hospital directors and local medical officials thought about state-controlled standardization. Throughout the empire – from Swabian Sigmaringen to Upper Silesia – local officials did not necessarily support government policy in this domain. Comparing the reliability and the precision of standardized and unstandardized instruments, they saw no benefit from official calibration. Nor did they perceive any technological advantages to state-certified calibration as opposed to self-calibration: "[T]he competition of the manufacturers among themselves resulted in more diligent production of instruments," as experience had shown. The results of officially certified instruments were "not at all favourable."[38] Some reports "recommended no general enforcement."[39]

Agreement with or objection to the draft edict related not to technical concerns about precision or reliability. The decisive arguments flowed from other considerations. Even opponents did not dispute "the progress … that state certification will bring."[40] However, expert opinions were usually rather hazy about what constituted progress. They stressed again and again the "reliability" of official instruments and their "desirable uniformity," although these benefits had not emerged in practice. So it was not any qualitative gain, but the so-called guarantee of reliability, that was crucial. Thus, officially certified measurement seemed to imply not instrumental accuracy, but rather authoritative safety. It was not so much the metric correctness of the measuring but rather some sort of general reliability that state sanction ensured and guaranteed.

The reports showed the significance of the state guarantee in three respects. First, they articulated independent expertise in the form of demands that state-employed physicians use state-certified standards. The certification took on the function of a state guarantee for the objectivity of medical opinion in the same way as trade associations and insurance companies required certified thermometers for the reports of medical examiners. Here objectivity meant official justification and assessment free from any personal inclinations. Second, for use of thermometers by unqualified staff and lay personnel, only state-certified, technical quality control could guarantee competence and reliability – at least in the eyes of the medical officials. While state regulation appeared superfluous or counter-productive in hospitals, it was necessary for everyone involved with thermometers outside the medical profession. Official certification seemed to guarantee the safety and validity of the measurement that – from the physicians' perspective – only the professional authority of their own guild could legitimate.

Third, official certification granted social status to the measurements. It validated the measurement independent of the technical quality of any single instrument. There was also no longer need for medical confirmation if a certified instrument indicated a temperature that the enclosed instructions defined as "high fever." State guarantees granted an official status to such terms and meanings. Therefore state certification served a social function, transporting professional authority from an originally medical practice to an impersonal and independent standard.

At three levels state-ordered certification replaced locally authorized standards in hospitals with statewide standardization. Within the profession, it legitimated medical expertise; outside the profession, it sanctioned the work of general practitioners vis-à-vis academic physicians. And in the public sphere, it guaranteed that everyone could measure fever without regard for professional expertise.

Despite medical officials' objections, state certification began in 1910. As a consequence of technical, industrial standardization, the normalized body temperature, created in hospitals, could now acquire greater social influence. The most obvious example occurs in the instructions of the Imperial Physical-Technical Institute enclosed with the certified thermometer describing the meaning of high readings. Those instructions allowed lay people to participate in the privileged objectivity of measurement.

Physicians were not enthusiastic about this development, although they were partly responsible for the increasing popularity of thermometers. One of them presented horror scenarios in which "a kind of meteorological station would be set up in the home of a feverish person or a number of instruments would wander promiscuously into all the accessible body openings of male and female clientele."[41] Such apprehensions surfaced most outspokenly in the illustrated mass press. There readers learned that "amicable doctor–patient relations" were impossible if patients tried "to control or even to master" the physician by acquiring medical knowledge.[42]

One author complained bitterly about the "unauthorized appropriation" of medical competence. After the introduction of antifever drugs, some patients, with a certain satisfaction, told their doctor that an hour earlier the thermometer still showed almost 38 degrees Fahrenheit but that now the temperature had dropped to 37. The measurement permitted the patients to form their own judgment about their illness – something that physicians did not always like. Some doctors tried in vain in the mass press to inform the lay public that a "small deviation from the ordinary level was often the cause of wholly unfounded concern."[43] This was, however,

no longer an esoteric one available only to physicians. If the mercury column rose above the red mark, then the illness was officially certified. At this level of social interaction, measurement registered a standardized meaning.

Technical standardization supported an inner standardization, of the definition and understanding of disease, most notably in the health insurance industry. The organizational structures developed in this sphere facilitated emergence of uniform standards of behaviour that were just as important for the labour movement as for the state or industrialists. Health insurance schemes (Kassen), to which factory workers or former guild members contributed for their own benefit, made it incumbent on all contributors to behave in a financially responsible manner if they wished to enjoy the practical solidarity of their colleagues. In spite of rigid rules set down in the statutes of Kassen, there was no need for sanctions or pressure in smaller ones, where everybody knew everyone else. Mutual control could form the backbone of insurance schemes because everybody had an interest in low payments and adequate reserves.[44]

Physicians received a major place in this care structure. Only they could determine whether to grant or deny benefits.[45] Their professional judgment could unlock sick pay. Yet their judgments were anything but independent. Working for insurance plans put them in a "most unfortunate" position.[46] They always had to deal with the suspicion of simulation of illness, which most company regulations threatened to punish in draconian fashion and which was implicit in the procedures verifying sickness.[47] None the less, at the turn of century the handbooks for health-plan doctors constantly reminded them not to treat the patient unjustly "as a simulator or hypochondriac."[48] They even insisted "that any member seeking medical help first and foremost be viewed as an ill person." In questionable cases, physicians should, like judges, always rule "in favor of the patient."[49]

Doctors often did not do this. Health-plan patients frequently complained about unjust treatment.[50] Some physicians in turn felt that patients were being presumptuous whenever they did not behave as indigents receiving medical care as an act of charity. Thus conflicts arose time and again, ignited by self-confident patients who, because they paid insurance premiums, made claims to services that, in the eyes of physicians, should be only for private patients. Newspapers accused health-insurance plans of awakening expectations by raising the mere "possibility of treatment." Whole "classes of the population" had acquired a "consciousness and a feeling for all manner of suffering that they had previously never taken notice of."[51]

Within this matrix, technical standardization and official certification exercised a social impact. They served as an independent authority that could resolve conflicts impartially and objectively, irrespective of the individuals involved.[52] State-certified objectivity could serve as a corrective force for social control. If, according to the labour health library, workers had a "certified standardized thermometer" at home, then an abnormal temperature relieved the sick from the moral pressure that the solidarity of the health-insurance community imposed. It also granted the worker the right to go on sick leave. An abnormal temperature justified physicians' actions in the face of penny-pinching insurance company boards. It likewise shielded them from workers' expectations – regardless of whether they simulated their complaints or, more probably, dissimulated them. Standardized measurement balanced mutually conflicting interests, obligations, and values in this way.[53]

Moral education and the internalization of Protestant virtues did not minimize the conflict for the persons concerned. On the contrary, things became rather more complicated for everyone caught up these conflicting motivations – care for the needy body, the threat of the family sinking into poverty, and behaviour that conformed with the social world of the labour community.

CONCLUSION: TECHNOLOGIES OF QUANTIFICATION

The quantification of body temperature was not a necessary result of technological advance that simply progressed as an instrumental objectifying practice from the laboratory to daily life via the hospital. It was also not an inevitable result of the inherent forces of medical science driven towards progress by curiosity and the urge to know. The technology of quantification was no black box that could move from one space of knowledge to another. Each shift related to a specific labour of assimilation: to the hospital, where patients adapted to new body techniques, and to daily life, where state decree standardized instruments.

Consequently, despite long-existing technical and scientific preconditions, fever measurement established itself only after the 1850s. It did so in two steps: in the transformation of the hospital before 1900 and in the daily life of most people soon afterwards. Quantifying body temperature grew out of a specific social space and was linked to specific social practice.

To say this is hardly new. Fever measurement, however, shows that the usual model of normalization which sees quantification as an

essential element of modern biopolitics cannot fully explain the technology of quantification. Without a doubt, quantifying and objectifying forged the biological, social, and cultural bodies we have today. However, other social practices also imparted these technologies. Embedded in a set of actions, they produced and related meanings that historians overlook if they understand quantification as *only* a disciplinary and regulative technique. Thus the body technologies that gave data their scientific value did not simply secure the coherent use of medical power. Quantification provided the patient with a body, whose objectivity lay outside the social restrictions and the social exclusion of traditional forms of interaction. Even state certification was not necessarily in the interests of medical experts. Rather, it contributed to their regulation. It ensured that, within the social asymmetry of the system of sickness insurance, patients could exert some social control over medical authority.

No doubt the quantification of body temperature is only one example of a new social technology. But the standardizations that prepared the way for quantification in the hospital and in daily life did not simply serve to document, measure, control, and regulate the individual. They also somehow allowed the individual to regulate and control this social technology.

NOTES

1 On this and many of the arguments presented in the article, see Volker Hess, *Der wohltemperierte Mensch: Wissenschaft und Alltag des Fiebermessens (1850–1900)* (Frankfurt am Main: Campus, 2000).

2 Stanley Joel Reiser, *Medicine and the Reign of Technology* (Cambridge: Cambridge University Press, 1977), chap. 5.

3 Georges Canguilhem, *Essai sur quelques problèmes concernant le normal et le pathologique*, 2nd ed. (Paris: Société d'Editions les Belles Lettres, 1950).

4 Michel Foucault, *Surveiller et punir: La naissance de la prison* (Paris: Gallimard, 1975), and especially his later work, *Histoire de la sexualité, vol. 1: La volonté de savoir* (Paris: Editions Gallimard, 1976), on which the recent discourses about "normalization" build. See, for example, Jürgen Link, *Versuch über den Normalismus: Wie Normalität produziert wird*, 2nd ed. (Opladen: Westdeutscher Verlag, 1997).

5 W.E. Knowles Middleton, *A History of the Thermometer and Its Uses in Meteorology* (Baltimore, Md.: Johns Hopkins Press, 1966). In the 1660s the first closed thermometers were produced, and after 1700 there were many trials to determine fix points and scales of graduation. See also Audrey B. Davis, *Medicine and Its Technology: An Introduction to the History*

of Medical Instrumentation (Westport, Conn.: Greenwood Press, 1981), 61–85.

6 It was "remarkable," as Gershon-Cohen mentioned, "how the thermometer comes in and out of prominence in physics and medicine without achieving a permanent niche in medical practice in spite of being fostered by some of the learned men in science and medicine." See J. Gershon-Cohen, "A Short History of Medical Thermometry," *Annals of the New York Academy of Sciences* 121 (1964), 4.

7 Kurt Sprengel, *Die Apologie des Hippokrates und seiner Grundsätze* (Leipzig: Schwickert, 1789), 165.

8 See, for example, Reiser, *Medicine and the Reign of Technology.*

9 Carl Reinhold August Wunderlich, "Remittierende Fieber mit Phlyetenideneruption," *Archiv für Heilkunde* 5 (1864), 57–77, and "Vorlegung einiger Elementarthatsachen aus der praktischen Krankenthermometrie und Anleitung zur Anwendung der Wärmemessung in der Privatpraxis," *Archiv für Heilkunde* 1 (1860), 385–416.

10 William Coleman, "Experimental Physiology and Statistical Inference: The Therapeutic Trial in Nineteenth-Century Germany," in Lorenz Krüger, Gerd Gigerenzer, and Mary S. Morgan, eds., *The Probabilistic Revolution* (Cambridge: Cambridge University Press, 1987), 201–26.

11 See Karl Ehrle, "Ueber den Quecksilberthermometer mit permanenter feiner Luftblase, für die Körperwärmebeobachtung am Krankenbette, für physiologische und pharmakologische Versuch," *Deutsches Archiv für klinische Medizin* 7 (1870), 345–55.

12 Ludwig Traube, "Ueber die Wirkungen der Digitalis, insbesondere über den Einfluß derselben auf die Körpertemperatur in fieberhaften Krankheiten," *Annalen des Charité-Krankenhauses zu Berlin* 1–2 (1850–51), 622–91; 12–120, 119ff.

13 See Marcel Mauss, "Die Techniken des Körpers (Les techniques du corps, 1934)," in Wolf Lepenies and Henning Ritter, eds., *Soziologie und Anthropologie* (München: Hanser, 1975), 199–220.

14 For an overview, see Alfons Labisch and Reinhard Spree, eds., "Einem jeden Kranken in einem Krankenhause sein eigenes Bett," in *Zur Sozialgeschichte des Allgemeinen Krankenhauses in Deutschland im 19. Jahrhundert* (Frankfurt am Main: Campus, 1996).

15 See Johanna Bleker, "To Benefit the Poor and Advance Medical Science: Hospitals and Hospital Care in Germany, 1820–1870," in Manfred Berg and Geoffrey Cocks, eds., *Medicine and Modernity: Public Health and Medical Care in Nineteenth and Twentieth Century Germany* (Washington, DC: German Historical Institute, 1997), 17–33.

16 See Ragnhild Münch, *Gesundheitswesen im 18. and 19. Jahrhundert: Das Berliner Beispiel* (Berlin: Akademie-Verlag, 1995).

17 See Hess, *Der wohltemperierte Mensch.*

18 The best example is the debate on the establishment of the Berlin University, in which physicians such as Hufeland argued for a small teaching clinic separated from the Charité hospital. Along the lines of the *theatrum nosologicum*, they argued that the prospective physician learned not from the quantity of observation but from the quality of exemplary study.

19 Claudia Huerkamp, "Das unterschiedliche Verhalten von Arzt und Patient in der Krankenhauspraxis und der privaten ärztlichen Praxis im 19. Jahrhundert," in Peter Schneck and Hans-Uwe Lammel, eds., *Die Medizin an der Berliner Universität und an der Charité zwischen 1810 und 1850* (Husum: Matthiesen, 1995), 254–68.

20 See Jens Lachmund and Gunnar Stollberg, "The Doctor, His Audience, and the Meaning of Illness: The Drama of Medical Practice in the Late 18th and Early 19th Century," in Jens Lachmund and Gunnar Stollberg, eds., *The Social Construction of Illness: Illness and Medical Knowledge in Past and Present* (Stuttgart: Steiner, 1992), 38–51.

21 Paul Uhle and Ernst Wagner, *Handbuch der allgemeinen Pathologie*, 5th ed. (Leipzig: Wigand, 1872), 23ff.

22 Adolf Strümpell, *Aus dem Leben eines deutschen Klinikers: Erinnerungen und Beobachtungen* (Basel: Vogel, 1925), 66–7.

23 Felix Niemeyer, *Ueber das Verhalten der Eigenwärme beim gesunden und kranken Menschen: Ein populärer Vortrag* (Berlin: Hirschwald, 1869), 43 (emphasis added).

24 Wunderlich, "Remittierende Fieber mit Phlyetenideneruption," 62ff.

25 For details, see Hess, *Der wohltemperierte Mensch*, 215–18.

26 Gustav Biedermann Guenther, "Ueber das Jacobshospital in Leipzig," *Leipziger Tagblatt und Anzeiger* 89 (1846), 829–31.

27 Barbara Elkeles, "Arbeiterautobiographien als Quelle der Krankenhausgeschichte," *Medizinhistorisches Journal* 23 (1988), 353, and "Der Patient und das Krankenhaus," in Alfons Labisch and Reinhard Spree, eds., "*Einem jedem Kranken in einem Hospitale sein eigenes Bett": Zur Sozialgeschichte des Allgemeinen Krankenhauses in Deutschland im 19. Jahrhundert* (Frankfurt A.M.: Campus, 1996), 361ff. See also Jens Lachmund and Gunnar Stollberg, *Patientenwelten: Krankheit und Medizin vom späten 18. bis zum frühen 20. Jahrhundert im Spiegel von Autobiographien* (Opladen: Leske & Budrich, 1995), especially 151–78.

28 V. Hess, "Die moralische Ökonomie der Normalisierung: Das Beispiel Fiebermessen," in Werner Sohn and Herbert Mehrtens, eds., *Normalität und Abweichung: Studien zur Theorie und Geschichte der Normalisierungsgesellschaft* (Opladen: Westdeutscher Verlag, 1999), 222–43.

29 See Per Maseide, "Possibly Abusive, Often Benign, and Always Necessary: On Power and Domination in Medical Practice," *Sociology of Health and Illness* 13 (1991), 545–61.

30 See V. Hess, "Messen und Zählen: Die Herstellung des normalen Menschen als Maß der Gesundheit," *Berlin Wissenschaft Geschichte* 22 (1999), 266–80.

31 See Michael Stolberg, "'Mein äskulapisches Orakel!' Patientenbriefe als Quelle einer Kulturgeschichte der Krankheitserfahrung im 18. Jahrhundert," *Österreichische Zeitschrift für Geschichtswissenschaft* 7 (1996), 385–404.

32 The political impact of science in general and of quantification and objectification in particular was evident in the liberal-democratic movement of 1848 and in subsequent decades, See the detailed study by Constantin Goschler, *Rudolf Virchow. Mediziner – Anthropologe – Politiker* (Cologne: Böhlau, 2002), especially part 3: "Szientismus und liberale Utopie."

33 C.R.A. Wunderlich, "Vorlegung einiger Elementarthatsachen aus der praktischen Krankenthermometrie und Anleitung zur Anwendung der Wärmemessung in der Privatpraxis," *Archiv für Heilkunde* 1 (1860), 416.

34 Lily Braun, *Memoiren einer Sozialistin*, cited in Gunnar Stollberg, "Haben messende Verfahren die Lebenswelt der Patienten kolonisiert? Überlegungen auf der Basis von Autobiographien," in Volker Hess, ed., *Normierung von Gesundheit: Messende Verfahren der Medizin als kulturelle Praktik der Medizin um 1900* (Husum: Matthiesen, 1997), 133.

35 Wunderlich, "Vorlegung einiger Elementarthatsachen aus der praktischen Krankenthermometrie."

36 See David Cahan, ed., *An Institute for an Empire: The Physikalisch-Technische Reichsanstalt 1871–1918* (Cambridge: Cambridge University Press, 1989).

37 See *Geheimes Staatsarchiv Preußischer Kulturbesitz*, Rep. 76 VIII B, Nr. 1731 (Berichte über Krankenanstalten und Prüfung der Thermometer).

38 Ibid., Report of the Medical Councilor, Aachen, 27 Nov. 1907.

39 Ibid., Report of the Medical Councilor, Stralsund, 18 Dec. 1907.

40 Ibid., district government Cologne, 30 Dec. 1907.

41 Johann Hermann Baas, *Medizinische Diagnostik*, 2nd ed. (Stuttgart: Enke, 1883), 66.

42 Fr. Dornblüth, "Aerzte und Publicum," *Gartenlaube* (1884), 478–80, 527–8.

43 Carl Posner, "Fieber und Fiebermittel," *Gartenlaube* (1909), 13.

44 Ute Frevert, *Krankheit als politisches Problem 1770–1880: Soziale Unterschichten in Preußen zwischen medizinischer Polizei und staatlicher Sozialversicherung, vol. 62: Kritische Studien zur Geschichtswissenschaft* (Göttingen: Vandenhoeck & Ruprecht, 1984), 215.

45 Ibid., 214.

46 Justus Thiersch, *Der Kassenarzt: Eine Darstellung der Gesetze für Versicherung der Arbeiter und ihre Bedeutung für den practischen Arzt* (Leipzig: Barth, 1895), 62.

47 Ignaz Zadek, *Die Arbeiterversicherung* (Jena: Fischer, 1895), 33; Marlene Ellerkamp, *Industriearbeit, Krankheit und Geschlecht, Zu den sozialen Kosten der Industrialisierung: Bremer Textilarbeiterinnen 1870–1914, Kritische Studien zur Geschichtswissenschaft* (Göttingen: Vandenhoeck und Ruprecht, 1991).

48 Jacob Wolff, *Der praktische Arzt und sein Beruf, Vademecum für angehende Praktiker* (Stuttgart: Enke, 1896), 97.

49 Karl Jaffé, "Stellung und Aufgabe des Arztes auf dem Gebiete der Krankenversicherung," in Moritz Fürst, ed., *Handbuch der Sozialen Medizin*, vol. II (Jena: Fischer 1903), 139.

50 Ibid., 139.

51 E. Düring, "Der Hausarzt," *Gartenlaube* (1910), 35.

52 Theodore M. Porter, *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life* (Princeton, NJ: Princeton University Press, 1995).

53 Hess, "Die moralische Ökonomie der Normalisierung."