EVER SINCE THE INTRODUCTION OF THE SMALLPOX INOCULATION in 18th-century Europe, physicians and patients alike have grappled with questions of individual risk, public health ramifications, and balancing the interests of the individual and the state. Adoption of such a preemptive measure rested historically on a calculation of risk fraught with unknowns and uncertainties; eg, risk of infection vs risk of prophylaxis. In spite of mathematical demonstration of the safety and efficacy of inoculation for the community as a whole, public trepidation prevented its general acceptance in 18th-century France, highlighting the sometimes divergent interests of the individual and the state.

A new form of medical knowledge—the statistical assessment of risk—emerged from the 18th-century French smallpox inoculation debate. After almost 2 decades of limited success in persuading the French to inoculate by highlighting the procedure’s successful practice in Turkey, China, and England, the philosophes, the leading philosophical, political, and social writers of the French Enlightenment, made a mathematical argument for inoculation. In April 1760, Daniel Bernoulli offered France’s Royal Academy of Sciences the first mathematical theory of the propagation of an infectious disease. Convinced that mathematics provided normative evidence that would compel individuals to inoculate, Bernoulli developed formulas for the propagation of smallpox and for the benefit that universal inoculation would provide. He concluded that the universal practice of inoculation would increase life expectancy at birth by 2 years and 2 months. Given the net benefit that inoculation afforded the individual and society, Bernoulli posited that rational individuals would inoculate, despite the 1-in-200 risk of perishing from the procedure. Yet much to the surprise of Bernoulli and his fellow philosophes, the French continued to eschew inoculation.

In his 1767 book, New Reflections on the Practice of Inoculation, the Italian physician Angelo Gatti captured what had, for 2 decades, thwarted Bernoulli’s and the philosophes’ efforts to promote voluntary adoption of inoculation. Gatti argued that without complete assurance of its safety, inoculation would never be widely practiced. The inoculation decision entailed a calculation of risk—the guaranteed risk of a mild case of inoculation-induced smallpox in the near term vs the uncertain probability of contracting natural, more virulent smallpox in the future. Challenging the philosophes, Gatti contended that individuals did not view medical risk through the lens of mathematical calculation. Echoing the arguments of the encyclopedist Jean le Rond d’Alembert, Gatti emphasized the paramount influence of the individual’s subjective, psychological experience. The risk of death in the short-term from the inoculation had a paralyzing psychological effect. Gatti wrote, “An immediate risk, no matter how slight, will always make a greater impression than a very great, but distant and uncertain one.”

Concerned primarily with self-preservation, no individual wished to be the 1 in 200 to perish from the inoculation. In practice, Gatti argued, people evaluated inoculation based not on statistics but on perception of its costs and benefits, the value one placed on one’s own life, and the quality and type of life to which one aspired.

Although the French medical community had not led pro-inoculation efforts in the 1750s, by the 1760s, the corporation of physicians was perceived as the sole entity capable of persuading the public to inoculate. Inoculation advocate Père d’Entrecolles wrote, “The public awaits... the competition between the luminaries [in the Faculté de Médecine]; its decision without a doubt will put an end to all the disputes that have been raised concerning [inoculation].”

The philosophes believed the medical community could quell the psychological, subjective concerns that impeded inoculation by attesting to inoculation’s safety and efficacy. Yet the French medical establishment was hardly a natural ally of the philosophes. The procedure necessitated a shift in physicians’ conceptions of their role, rendering them purveyors of disease as well as healers, since inoculation entailed introducing viral matter from the pus of a virulent smallpox. Within 7 to 10 days, the inoculee fell ill with a mild form of the disease. Moreover, physicians acted cautiously, cognizant of their limited understanding of smallpox’s etiology and the inoculation’s impact. Into the 1770s, physicians expressed concern as to whether inoculation provided lifelong protection against contracting smallpox, whether inoculees spread natural smallpox, and whether inoculation-induced smallpox (known in the 18th century as “artificial smallpox”) was less virulent than natural smallpox. Simultaneously, physicians faced a demanding and emotionally charged public who labeled as “murderers” those who lost patients to inoculation and yet accused physicians who refused to inoculate of complicity in thousands of deaths. The public’s demand for action in a situation in which the public good was poorly defined placed tremendous pressure on the deliberative, consensus-oriented culture of the 18th-century French medical guild.

A severe, protracted, Parisian smallpox epidemic in the winter of 1762–1763 forced the French medical community to the forefront of the inoculation debate. France’s leading court, the Parlement de Paris, issued an order halting the practice of inoculation and requesting that the Paris Faculty of Medicine rule on its efficacy and safety. The Parlement’s response to public perception that inoculation had contributed to the outbreak’s severity galvanized the medi-

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cal community. A debate within the medical faculty ensued in late summer 1764. For more than 2 hours, Guillaume-Joseph de L’Épine, leader of the anti-inoculation physicians, enumerated the arguments of inoculation advocates and then refuted each of them. His discourse focused on safety: inoculation must be avoided because it could result in death.

The following week, Antoine Petit delivered a comparatively brief address in favor of tolerating inoculation. Like de L’Épine, Petit focused on the safety and efficacy of inoculation, but he reached the opposite conclusion. Inoculation should be tolerated, provided that successful inoculation prevented recurrence of the disease and as long as artificial smallpox remained less dangerous than natural smallpox. Petit cited reason and historical example to justify his position. If inoculation did not work, it would not have been practiced for centuries in Turkey and Asia, nor for decades in England.

In addition to emphasizing the safety and efficacy of inoculation, Petit argued that inoculation was in the national interest. Echoing the statist, Bernoullian perspective, Petit contended that universal inoculation would be an unparalleled good, fueling economic growth and affording protection against depopulation. In an era when demographic strength was perceived as imperative to France’s status as a European power, inoculation, by reducing the smallpox mortality rate from 1 in 7 to 1 in 200, offered the state a substantial advantage. As Petit wrote, “And if one sees in the future, the uncountable posterity, that will be born of men saved by Inoculation, one must also see, that if there were a European nation that adopted inoculation of its children, while its neighboring peoples rejected it... that nation [which does not inoculate] will find itself fatally weakened and others will subjugate it without difficulty.”

Despite the proinoculation physicians’ recognition of inoculation’s benefit to the individual and the state, Petit and his colleagues stopped short of advocating its universal adoption. Petit acknowledged that the medical community was reluctant to mandate use of a new prophylactic that might ultimately be discredited, bringing opprobrium on physicians. Yet, more significantly, Petit and his colleagues argued for the primacy of individual and family choice. They believed that third parties, even licensed physicians, should not impose their views on inoculation on patients; the decision to use a potentially deadly prophylactic should be reserved for the patient and his family. Petit’s colleague Gatti likewise noted that the inoculation decision should be made by the individual or, in the case of the minor, by the next of kin.

Rather than using its professional authority to influence royal policy by recommending universal adoption or prohibition of inoculation, the medical community joined the philosophes in educating the public, thus facilitating informed patient decision making. Medical and lay journals published hundreds of articles on smallpox and inoculation between 1755 and 1775. Physicians recounted successful inoculations of celebrities—foremost among them the inoculation of the children of Duc d’Orléans in 1756—and even of their own children. While emphasizing the safety, reliability, and peace of mind provided by inoculation, physicians empathized with the agonizing decision facing potential inoculees. The medical community understood the personal, familial nature of the inoculation decision because physicians perceived they were in an analogous position vis-à-vis their patients as parents were vis-à-vis their children. Both wrestled with how to balance the risk associated with inoculation with the guilt that might ensue should a noninoculated individual succumb to natural smallpox.

By respecting the sentimental considerations associated with inoculation and by reinforcing that inoculation should be a personal and familial decision, the medical community legitimized sentiment as a rational basis for objecting to inoculation. The physicians revealed the limitations of statistical assessment of risk in shaping public perception by highlighting the myriad ways in which individuals might act when confronting medical risk. In doing so, they also helped expose the fragile foundations of the French inoculation campaign predicated on voluntary participation and a naive belief that inoculation was always in the best interest of both the individual and the state. Yet in failing to resolve the competing and often conflicting interests of national welfare, public health, and individual choice, the 18th-century French medical community ultimately did not advance the proinoculation cause. Indeed, the French did not widely embrace prophylactic measures against smallpox until Jenner’s safer cowpox vaccination technique superseded inoculation in the 19th century.

REFERENCES