



Zabdiel Boylston's evaluation of inoculation against smallpox

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DECLARATIONS Variolation, known in the 18th century as inoculation, was introduced almost simultaneously in Boston and London in the early 1720s.¹ A furious debate followed. Among the issues were the religious implications of interfering with divine providence; the legality of spreading a potentially fatal infection; whether the disease induced really was smallpox; whether it was safer than natural smallpox; and whether inoculation induced immunity. Thomas Nettleton, a Yorkshire physician and inoculator, suggested in a letter sent in 1722 to James Jurin, Secretary of the Royal Society, that the best way to answer the safety and efficacy question was to make a comparison between the mortality of smallpox and the mortality among those inoculated.^{2,3} He submitted 3405 cases of natural smallpox, of which 636 died, whereas there had been no deaths among the 60 patients he had inoculated.

Competing interests None declared

Funding None

Ethical approval Not applicable

Guarantor AB

Contributorship Both authors contributed equally

Acknowledgements Additional material for this article is available from the James Lind Library website (www.jameslindlibrary.org), where it was originally published

Jurin took up the suggestion and advertised for information from anyone with experience of natural smallpox or variolation.⁴ To simplify the investigation and avoid arguments about subjective issues such as the severity of an individual case he only recorded death or survival. His correspondents revealed that the operation was practised

throughout England and that the operators ranged from fully licensed physicians to surgeons, apothecaries and lay women.⁵ Jurin published annual summaries of his correspondence between 1724 and 1727.⁶⁻¹⁰

Table 1 shows the data presented by Boylston¹³ and Jurin,⁹ analysed using a simple χ^2 analysis. The mortality among inoculees was similar on both sides of the Atlantic, but while natural smallpox was associated with a higher death rate than inoculation in both places, the relative increase in the rate was 8 in Boston and 6.9 in England. This apparently similar effectiveness was present despite differences in the operators and the exact method of inoculation.

This very early use of mathematical evidence in favour of inoculated smallpox over the natural disease influenced the adoption of variolation both in England and in the colonies. In 1731 David Hartley, now remembered as the father of psychology,¹⁴ used these figures to argue for general inoculation in the town of Bury St Edmunds because it would save about 600 lives.¹⁵ In 1730, when smallpox reappeared in Boston, Boylston republished his book and several of the town's doctors, including William Douglass, his old nemesis, now offered variolation to their patients.¹⁶

The published evidence was taken so seriously that opponents of variolation tried to argue that the figures were biased.^{4,17} They complained that inoculators regularly excluded pregnant women and those in ill health, and that they were treating a healthier population than those who suffered the natural disease. The title of Boylston's book – *An historical account of the smallpox inoculated in New England upon all sorts of persons, whites, blacks, and of all ages and constitution* – may represent a reply to these criticisms. The efficacy and relative safety of inoculation compared with natural disease was accepted both in England and in the North American colonies. It was used in Philadelphia in 1735 and Charleston, South Carolina in 1738 when

Table 1
Fatality of natural and inoculated smallpox

	Boston*		England†	
	Died	Survived	Died	Survived
Natural smallpox	844	4915	2848	19303
Inoculated smallpox	6	276	13	611‡

* Relative risk natural vs inoculated smallpox: 6.9 (range 3.2–15)
p <.0011

† Relative risk natural vs inoculated smallpox: 8.0 (range 4.7–13.6)
p <.0011

‡ Relative risk inoculated in Boston vs England: 1.02 (range 0.4–2.6)
p >.9

epidemic smallpox appeared. By the middle of the 18th century John Adams and Thomas Jefferson had been inoculated and the Royal College of Physicians had endorsed the practice as safe and beneficial.^{4,18}

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However, the significant careers advice that abounds concerning specialties can often be ignored by those meant to benefit – thus it should be encouraged that students should mould an investigative mindset that underpins success.

Simon Lammy

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DECLARATIONS

Competing interests

None declared

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- 1 McNally SA. Competition ratios for different specialties and the effect of gender and immigration status. *J R Soc Med* 2008;**101**:489–92
DOI 10.1258/jrsm.2008.08k026

Confusion in equal measure

Sir,

With successive ocular oscillations I was able to visually partake in your scripted correspondence which you had consensually contributed to the *JRSM*.¹ It was only by this due process, and not, I hasten to add, by any other assimilated or subjunctive discursions [sic], that I am both rendered and obligated (here and now, that is, in this present moment of time) to concur and unconditionally agree with your stated and assumed viewpoint. Your avowed, declared and affirmed stance is admirable – and I am minded to assume a positive, and thus non-negative, psyche which is in turn positive (and thus non-negative) in both willpower and essence. That said, one must remember, that I should not publicly nor openly state these assertions. We know that overt is superior to covert, but equally it then surely is by the same token akin to the pouch of Douglas in your own profession: what lurks therein should by definition lurk. To be seen to be not lurking implies a measure of dissimilitude, and this leads to a lack of perspective.

Elaboration evaporates to a greater sense of overdoing. And the result? Well, failure of course. Just as the sun should never set on a breach, then too much exaggeration leads to the greater folly. The folly of Lord Darzi's attempt at evidence-based medicine. To gain a

foothold in such arguments is to clutch at random ideas which float, ballpark-figure-like, in an imaginary delusional ether.

My point is thus: it is to realize that this letter will be of greater worth but, surely, lesser by dint of its certain context. My approach in such matters is but surely akin to that of your own.

In shared and mutual confusion,
Yours etc,

Dr Michael Barrie

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Competing interests

None declared

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DOI 10.1258/jrsm.2008.08k027

Prognosis: medical magic

I was surprised that Dr Sokol's essay on medicine and magic did not mention the soothsaying activity of doctors.¹ Prophesying clinical outcome is an everyday medical activity but this relies heavily on mathematical probability. To the patient, a doctor who can foretell the future may appear to have the charisma of the magician but today most patients believe that our predictions are based on solid scientific facts. Our diagnostic skills are derived from our observations of the attributes of a disease, without necessarily identifying the cause. In fact, with the exception of diseases related to micro organisms, aetiology is a mystery around which we elaborate unproven hypotheses. Herein lies the magic of medical practice. We operate not by sleight of hand but by sleight of word. Prophesying leans heavily on historic non intervention but our ethic is to treat according to the acquired knowledge within our own speciality. Characteristically we do not recommend placebos to cancer patients as alternatives to chemotherapy. Prognosis could be seen to offer the patient either a stick or a carrot. Without treatment, 'you will die'. With treatment, 'you may live a bit longer'. We bolster our beliefs when, with treatment, the patient survives beyond that arbitrary deadline. What if,

after a period of reflection, the patient defies the witchdoctor and goes it alone? Do we continue to review that patient in outpatients knowing that management, with their eye on the purse, see these follow-ups as loss leaders? Do these loners fall into the sympathetic laps of the nurse-specialist or practice nurse? The 'sympathetic' but devious medical alternative might be to continue to see the patient, except privately. If the patient changes their mind we will probably change the prognosis for the worse. How often have we seen our prognostications and those of others turned on their heads? Patients' choice may be influenced by our messianic fervour to treat and their lack of medical literacy.² Prognosis carries a mystical/magical power of prediction and is all too easily used as leverage. The magician performs his trick and deceives us. Doctors merely deceive themselves.

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Competing interests

None declared

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DOI 10.1258/jrsm.2008.08k028

Erratum

The authors of the paper 'Zabdiel Boylston's evaluation of inoculation against smallpox' (*JRSM* 2008;**101**:476–7)¹ are Arthur Boylston and AE Williams.

The author of the paper 'James Angus Doull and the well-controlled common cold' (*JRSM* 2008;**101**:517–19)² is Harry M Marks.

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DOI 10.1258/jrsm.2007.08k025