

DIVERSION

The antecedents of epidemiological methodology in Arthur Mitchell's surveillance and care of the insane

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Arthur Mitchell, sometime Commissioner in Lunacy for Scotland, outlined some of the principles of epidemiological studies in the 1860s. He was responsible for a system of care in the community for the insane that was, at the time, influential. In the course of his work he carried out studies that reflected concern with several of the methodological issues raised by contemporary epidemiological investigation.

Introduction

By 1875, when George Darwin—the second son and fifth child of Charles Darwin—reviewed evidence on the putative detrimental effects on offspring health of cousin marriages,¹ there was already extensive medical literature on the supposed effects of consanguinity. However, this mostly consisted of anecdotal reports or *ex cathedra* statements.^{2,3} In his article, reprinted recently in the *IJE*⁴ with commentaries,^{5–8} George Darwin considered that the most serious empirical research on the topic to date had been carried out by Arthur Mitchell, when he was deputy commissioner of lunacy for Scotland. Mitchell's papers—published as three articles in the *Edinburgh Medical Journal* in 1865^{9–11} and then in a condensed form in the *Memoirs of the Anthropological Society of London*¹²—presented a wide range of material, mostly from specially conducted surveys that he had carried out. His extensive report remained inconclusive as to the question of the actual effects of cousin marriage, but the striking aspect of his work is Mitchell's understanding of what adequately designed studies would look like. In his *Edinburgh Medical Journal* articles—the full text of which are available on the *IJE* web site (Supplementary data)—he recognized that the initial data available to him were entirely inadequate. After presenting five cases of

families, in which there was apparent morbidity of offspring due to consanguinity, he stated:

I have said already, that it would be unphilosophical to found a belief even in the existence of an evil done to children by a bloodship between their parents on such evidence as the detail of a few startling cases like the five which precede, and that it would be still more unphilosophical to look to such evidence for the teaching of a rule in the question. For, in actual fact, we know that however viewed, these are most exceptional cases; and, what is more, we also know that it would be easy to set off against them cases quite as deplorable in their character, where the most careful inquiry has failed in detecting any kinship among the progenitors of the defective children for generations back.⁹

As an alternative to such unreliable anecdotal evidence, Mitchell suggested that 'We must, therefore, turn to some other mode of investigation for a supply of data from which we can draw inferences with greater security and confidence. It appears to me that the following line of inquiry is calculated to meet this demand.'⁹ He then provided a description of how what would now be termed epidemiological methodology could be applied to the problem. He advanced two strategies in this regard. First he suggested it would be possible to take

a large number of instances of any defect which kinship in marriage is alleged to cause in the offspring, and ascertain how many are the issue of parents related to each other by blood, and how many of parents not so related. Either the number must be so large as to preclude the possibility of selection in any form, or it must include as nearly as possible *all* instances of the defects which occur

in the section of the community from which they are drawn; but in any case the number should not be small. The results must then be compared with the proportion of cousin marriages to other marriages in the same community.⁹

He went on

The second mode of investigation consists in taking certain localities and collecting the family history of every marriage among the people there, and then comparing the results of those in which a kinship existed with the results of those in which it did not exist. The falsifying effects of unintentional selection are reduced to a minimum in this line of inquiry, which, if carried out on a large scale, would lead us more certainly to the truth in this matter than any other. But in that case, it would require to embrace a field so wide as to make it impossible for any private individual to undertake the inquiry.⁹

Given his clear recognition of the form of robust methodology that would be required to investigate population health issues, it is perhaps unsurprising that Arthur Mitchell went on to report what appears to be one of the first prospective studies, a follow-up of all new patients admitted to lunatic asylums (as they were then called) in Scotland in the year of 1858 (<http://bjp.rcpsych.org/cgi/reprint/22/100/507.pdf>) (available on the *IJE* web site as supplementary data).¹³ Only one citation of this remarkable paper could be located through Google Scholar and ISI Web of Science,¹⁴ and this reference merely listed it among several early papers presenting statistical material related to psychiatric illness, wrongly classifying it as a study coming from England. While there will be references not picked up in this way (e.g. Macpherson,¹⁵ Bynum¹⁶), it is clear that the work has received little recognition.

Mitchell's report explicitly included only what would now be called incident cases—i.e. patients who were first admitted in 1858 and had never been under asylum treatment before. Each of the 1297 patients (the total number of new patients admitted during 1858) was followed-up to 1870. The follow-up was successful for 1096 (85% of cases), a high proportion for present-day epidemiological studies without record linkage. The Table presents the status of the 1096 patients in 1870.

Mitchell discussed the problem introduced by the 201 (15%) patients who were lost to follow-up. He stated that 'From what became known to me while making this inquiry, and from knowledge otherwise acquired, I think we may safely assume that what was found to be true of the 411 [patients who were outside of the asylum and located in 1870] would have been found to be substantially true also of the 201, had we succeeded in getting the information

Status in 1870 of 1096 patients admitted to an asylum in Scotland for the first time in 1858 (adapted from Mitchell 1877¹³)

	No of patients (<i>n</i> = 1096)	Percentage
Still living in an asylum	273	25
Died in an asylum	412	38
Died outside the asylum in state of insanity	42	4
Died outside asylum in a state of sanity	78	7
Living outside an asylum in state of insanity	94	9
Living outside an asylum in state of sanity	197	18

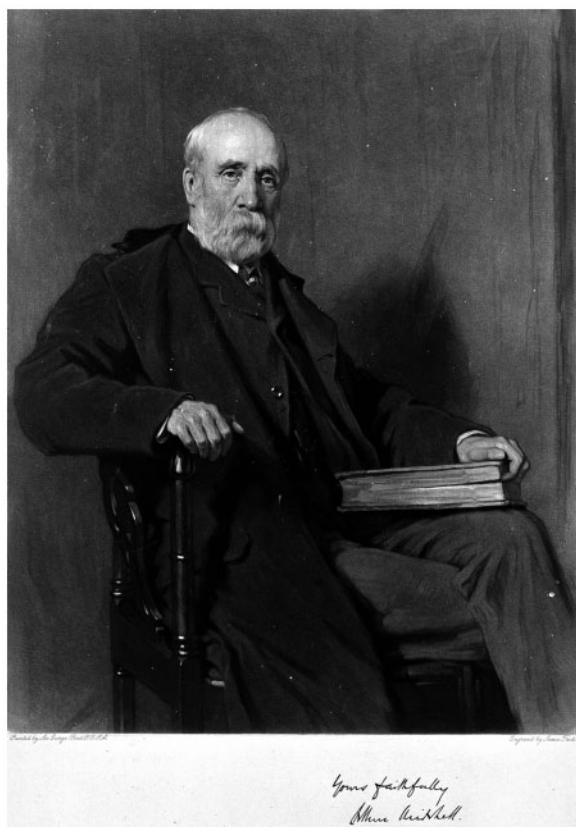
regarding them which was desired.' He then calculated the disposals of the total 1297 patients based on this assumption. He went on to examine the year-by-year data and demonstrated that recoveries, if they were to occur, were liable to be seen in a year or 2 after admission. As with the contemporary 'revolving door phenomenon'¹⁷ some patients were frequently discharged and re-admitted over the follow-up period.

Mitchell concluded in typical modest fashion that 'I have confined myself as much as possible in this paper to a mere statement of the results of an inquiry, which, so far as I know, has not previously been made, and which in some directions teaches new lessons, and in others gives precision and certainty to opinions already entertained.'⁹ He recognized that his findings might be found not to apply to a second group of patients who were admitted for the first time during some other year, but concluded by reporting a follow-up from 1868 to 1875 of 1319 patients admitted for the first time in 1868, which led to similar conclusions.

Who was Arthur Mitchell?

Arthur Mitchell (1826–1909) was a polymath of a kind not uncommon in the Victorian British administrative class. A graduate of Aberdeen University, he also gained medical education in Paris, Berlin and Vienna.^{18,19} The Lunacy Act for Scotland, passed in 1857, established the General Board of Lunacy for Scotland,²⁰ and Mitchell, who had spent a few years in private practice, became one of the two deputy commissioners in lunacy required by the act. In 1870, he became the Commissioner in Lunacy for Scotland, a post he held until his retirement in 1895.

Mitchell's particular interest was in the boarding-out of people then referred to as lunatics, the insane, idiots and imbeciles. His 1863 report for the



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Board appeared to change initially unfavourable opinions regarding such an approach,²¹ with his ideas being made more accessible through his 1864 book, *The Insane in Private Dwellings*.²² The Scottish scheme—whereby patients left the asylum and were, in theory, treated as a member of the family with which they lived—was largely seen as Mitchell's creation.²¹ The work of 'the Scottish apostle of boarding-out'²³ apparently influenced similar systems elsewhere.²⁴

The proportion of the population in public asylums grew across the first half of the 19th century,²⁵ with the *Edinburgh Review* referring to 'wing after wing spreading, and story after story ascending, in every asylum throughout the country'.²⁶ It is against this background that the boarding-out system that followed from the 1857 act was instigated. In some ways, it regulated and put on a firmer legal footing what was already happening. However, as the Royal Commission that preceded the act found, the number of patients in private houses was not known (different authorities gave estimates of 1363 and 1998).²⁷ After the Act patients cared for at home were supposedly visited by a doctor appointed by the local authority once every 3 months, an inspector of the poor once every 6 months and at least once a year by one of the two deputy commissioners in lunacy, and these

unannounced visits could be at any time of day and night.²⁷ Such visits may underlie the high follow-up rates that Mitchell was able to report in his 1877 paper discussed above; indeed, it was claimed that the commissioners 'know almost every patient'.²¹ As Mitchell stated in the paper, 'it is scarcely necessary to say that I am indebted to my official position for the means of making an inquiry of this kind'.¹³ In fact his 1864 book included a precursor of his later study, in that it reported a 4-year follow-up of the 293 'lunatics' living in private houses within one district. He found that 44 had died, 192 remained patients in private houses, 34 had been removed to asylums, 17 were regarded as sane and 6, who had left the district or country, were not followed-up.²²

There was considerable interest in the Scottish system. The *American Journal of Insanity*—the official organ of the American Psychiatric Association, now the *American Journal of Psychiatry*—published a long summary of Mitchell's book in the year it was published.²⁸ In 1898 the same journal provided a summary of a report on 'The Insane Poor in Private Dwellings in Massachusetts'²⁹ that Mitchell had originally published in the *Boston Medical and Surgical Journal*.³⁰ Mitchell reviewed arguments against the boarding-out system in the USA, and one that was advanced—that 'most women shrink from near association with persons of impaired intellect'—was not, he thought, true of women in Scotland.

As D.N. MacKay³¹ points out, while at 'no stage did Mitchell use the polysyllabic horrors: normalisation and de-institutionalisation', his work foreshadowed them. The Scottish system was explicitly linked to the celebrated Belgium town of Geel (or Gheel) with its system of community care for the mentally disturbed. As with later advocates of community care, Mitchell emphasized both the humanitarian aspects and the potential cost savings. In his words, 'It may be accepted as always true, that that which is best for the insane poor is best in the end also for the pockets out of which they are supported' (quoted by Whitelaw³²). As an obituary writer put it, 'he never forgot the economic side of the question, and he never considered any scheme for providing for the insane of a locality without keeping prominently in view the interests of the ratepayer'.³³ The economic benefits were certainly ones that proved attractive to contemporary commentators from the USA.³⁴ A North American authority approvingly reported that 'the Scotch critic does not mince matters in discussing and dismissing the risk that persons will "take patients for the sake of gain" because "in Heaven's name, for what other purpose would they take them?"'²³ The *Edinburgh Review* presented calculations in terms of pounds, shillings, and pence as to how much the home care system could reduce the expense on 'the costly palaces of the insane'.²⁶ The boarding-out system can clearly be seen as a component of the 19th century 'free trade in lunacy'

identified by Andrew Scull in his incisive critiques of both asylums and what has become known as 'care in the community'.^{25,35}

The system engendered reactions to community care with contemporary resonance, such as the fear that the value of property in the vicinity of private houses boarding the insane would decline.³⁶ The somewhat bucolic view of the domestic life of the boarded-out patients was challenged. 'The aesthetic term of "cottage" applied to these dwellings is an utter misnomer – to certain of them the term "hovel" would be more appropriate', said John Batty Tuke,³⁷ the renowned psychiatrist who was at the time the medical superintendent of the Fife and Kinross District Asylum. 'That all these patients were in more "homelike" circumstances than if confined in an Asylum is most true', he went on, 'many of them were in the full possession of the homelike influences of dirt and squalor'.³⁷ He reported that patients transferred from his asylum were anaemic and thin after only a few months of boarding-out and one patient was reported as wanting to be re-admitted to the Edinburgh City Poorhouse lunatic wards due to the dullness and monotony of Kennoway, the village she was boarded in. The poorhouse was 'an institution not peculiarly characterized by variety, but still a very vortex of excitement compared with Kennoway'.³⁷ Further, Tuke complained, the claim that death rates were lower among boarded-out than asylum patients—the strongest argument put in favour of the system, and one advanced by Mitchell in his 1864 book²²—was untenable, being due to selection of healthier patients for cottage transfer.³⁷

Adverse reaction by some asylum medical superintendents could be anticipated; the *Edinburgh Review* recognized in 1870 that 'it will be strange if some do not earnestly oppose it... for vested interests are growing up which warp the minds of the medical superintendents, as any great or radical change in the treatment of the insane would, they imagine, endanger their present position'.²⁶ Tuke proposed that the boarding-out system should be improved rather than abandoned, partly through superior supervision which, unsurprisingly, he suggested should come from the district asylum medical superintendents.^{37,38}

Mitchell made contributions to several other aspects of medical science. He demonstrated, by comparing 'idiots' with all children, that there was a strong association between maternal age and idiocy, with 27% of the former and less than 6% of the latter having mothers aged 40 years and over when they were born.³⁹ The extent to which this reflected Down's syndrome is impossible to establish now. He also measured the head sizes of every adult 'idiot' that he examined and, in ingenious fashion, used the average male head size in Scotland from hatters' sales data as a comparator.³⁹ He concluded that 'the heads of idiots as a rule are abnormally small, but a small head is not an essential in idiocy'.³⁹ He investigated the death

rates of people in asylums,⁴⁰ where he found that the observed to the expected number of deaths, on the basis of general population data, was high at younger ages (ranging from 14.7 to 19.5 for the 5-year age groups from 10 to 50), but then, after 'the age of 50, that is when the working period of life is over' the excess declined.⁴⁰

His medical research was not confined to mental health. For example, with Alex Buchan, the Secretary of the Scottish Meteorological Society, he examined how various aspects of the climate and weather related to mortality rates, utilizing data from London and elsewhere.⁴¹ This investigation—considered at the end of the 19th century to be the most rigorous research to date⁴²—demonstrated that most conditions which showed seasonal variation in mortality, in particular respiratory disease, had lower rates in the summer months, but diarrhoeal disease showed a summer excess.^{41,43} These conclusions were later supported by William Guy⁴⁴ in his analysis of temperature and its relation to mortality.

Arthur (later Sir Arthur) Mitchell made contributions in many other areas. From 1867 he was a fellow of the Society of Antiquaries of Scotland and wrote extensively about archaeology and prehistory. He served as a Professor of ancient history to the Royal Scottish Academy from 1878, was president in 1908 of the Royal Meteorology Society and wrote extensively on a wide variety of topics, including books on the topography of Scotland, travels within Scotland and the bearing of ancient history and folklore on notions of civilization. As one small illustration of his researches and collecting, he reported exchanging tobacco for elaborate miniature nude female figures, carved using hand-crafted stone tools from ox bones.⁴⁵ As an obituary writer saw it, a particularly important concern for Mitchell was that 'the degree of civilization attained must in the long run be measured by the extent to which it succeeds in mitigating or annulling the miseries arising from the uncontrolled processes of natural selection'.¹⁹ His final book, published in 1905, was (to this reader the somewhat odd), 'Dreaming, laughing and blushing'.⁴⁶

Mitchell and epidemiological methodology

Mitchell is not some 'forgotten father' of epidemiology—in terms of methodological innovation, it appears his work had no influence. He does represent how the scientific spirit of Victorian Britain envisaged approaches that appear, in some ways, contemporary. His thinking clearly reflected issues of representativeness, loss to follow-up and the importance of identifying what would now be called 'incident cases'. He was not, in his follow-up investigations of the institutionalized and non-institutionalized mad, exploring aetiology, and therefore was not concerned with exposure. His prospective studies would now be seen as

investigations of prognosis, and perhaps called 'clinical cohorts'.

Mitchell's discussion of how the effects of consanguinity could be studied largely related to his failure to achieve what he recognized was necessary. As he willingly conceded, "I have succeeded in doing a little, and that little appears to me to have value, though not such a value as I hoped would be the case. I was prepared to encounter difficulties and disappointments, but I did not expect them to be quite so great as they turned out to be".⁹ With regard to the first of the two types of study he outlined, for nine counties of Scotland he made careful enquiry in 1860 and 1861 into every case of lunacy living in private dwellings—presumably as part of the inspections required by the boarding-out system that he was instrumental in introducing—and determined the degree of consanguinity of the parents. He could not obtain the ratio of consanguineous to non-consanguineous marriages in the population as a whole to compare the 1 to 17 ratio he identified for the cases, however.¹⁰ With respect to the second type of study Mitchell attempted to enumerate the degree of consanguinity in every marriage in several communities—generally selected on the grounds that rates of consanguineous marriage were thought to be higher than usual—and ascertain the status of all offspring of these unions. These were small populations, and Mitchell concluded:

"With reference to none of the localities have I been able to obtain the full information I aimed at. Indeed, I am very conscious that I am far from having succeeded in doing what I proposed to myself. I regret this all the more that I think no method of investigation would so satisfactorily settle this vexed question as that now referred to. The result of my efforts, however, convinces me that it could not be carried out in a thoroughly satisfactory manner by any private individual. If, for several districts of the country not too limited in size, and differing from each other *quoad* the social condition of the people, we could obtain full and accurate information as to the family history of *every* marriage, in which a blood-relationship existed between man and wife, and also of every marriage in which no such relationship existed, we should assuredly have before us a mass of facts from which we could draw conclusions of a definite character and worthy of trust; but to obtain possession of such data will never prove an easy task".¹¹

Mitchell's attempts at obtaining data on the outcome of all marriages was retrospective in nature, although he approvingly noted attempts in France to document at the time of marriage the degree (if any) of consanguinity, in order that effects on the offspring could be studied.⁹ It has been suggested that the first cohort

studies (considered to have been reported from 1912 onwards⁴⁷) were of a retrospective type, and in his studies of consanguinity Mitchell was attempting something of this kind. In his clinical cohort studies it appears that he may have been investigating what happened to groups that he was originally responsible for enumerating.

Mitchell perhaps deserves more than a footnote in the history of epidemiology. On his death, it was said that it 'cannot be doubted' that he was 'one of [the] brightest ornaments' of both Scottish letters and science.¹⁹ The disappearance of those that loomed large in many domains of culture and knowledge is as humbling as is the realization of what they knew.

Supplementary data

Supplementary data are available at *IJE* online.

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