

Research on the association between volume and outcome in acute hospital care

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The briefing prepared by North West Thames Regional Health Authority for its meeting with St Albans Hospital Action Group on November 30 claimed that:

There is considerable public health research, matching professional opinion, which demonstrates that where doctors treat greater volumes of cases the outcomes - in terms of survival and return to good health - are better.' (para 3.1.)

A similar claim was made in the Region's 'Approval in principle submission', made to the Regional Health Authority at its meeting on December 13:

There is now research to demonstrate that relatively higher volumes of caseload produce better health outcomes as doctors become more skilled at treating particular conditions' (Paper B, para 4.9.)

The Community Health Council subsequently asked the Regional Health Authority for details of the research on which these two statements were based, as there were no references in the documents. It was sent a report reviewing the research and subsequently given references to two further articles in North American journals. Examination of these three publications reveals a considerable mismatch between the research and the statements and also raises questions about the relevance to North West Herts of research done within the very different system of health care in North America.

1. *Volume and outcome in hospital care: a review of the literature*, by Alastair Johnston and Nick Black of London School of Hygiene and Tropical Medicine. Published by North West Thames Regional Health Authority, February 1989. A summary appears in: Black N, Johnston A. 'Volume and outcome in hospital care: evidence, explanations and implications'. *Health Services Management Research* 1990; 3: 108-114.

This is a review of 'around 110 publications'. It found that most of the research between volume and outcome was done in the United States and was largely confined to six areas of health care: perinatal care, surgery, coronary care, cardiac catheterisation, trauma services for severely injured people and burns services. Much of the research was focussed on questions of regionalisation of services, rather

than the size of general hospitals, which is the question in North West Herts. In particular, the research on perinatal care discussed in the review, largely focuses on regionalisation of neonatal intensive care for very ill newborn babies. This is not what is at issue in North West Herts, as Paper B of the Hospital Action Group's supplementary submission points out in greater detail.

The review considered 'hospital volume', the size of the hospital, while 'clinician volume', the number of operations or procedures done by individual doctors was listed among the confounding factors. In most studies, death in hospital was used as the measure of outcome. The review pointed out that this could be affected by discharge policies, and pointed out that although this may be the easiest outcome to measure, it may not be the most appropriate.

There was no statistical association between size and mortality for neonatal care, coronary care and burns. It was concluded that mortality is lower in larger hospitals for several, but not all surgical operations, cardiac catheterisation and care of severely injured people. The authors discussed two possible hypotheses for this. One was that larger hospitals provided more experience for doctors and the second was that if hospitals had good outcomes, then more people were selectively referred to them. Other factors which could play a part are whether more specialised hospitals deal with people with more complications, and particularly in North America, the extent to which people had access to care in particular types of hospital.

2. Hannan EL et al. 'Investigation of the relationship between volume and mortality for surgical procedures performed in New York State hospitals', *Journal of the American Medical Association* 1989; 262: 503-510.

This study looked at the association between both 'physician volume' and 'hospital volume' and the proportion of patients dying in hospital for 16 procedures or groups of procedures. It found no relationship for 11 of them. The article consists mainly of a detailed analysis for the 5 where a relationship was found. In four of these 'physician volume' was more important than 'hospital volume', suggesting that doctors benefited from experience, but that this may not be related to the size of the hospital in which they gained it.

3. Hartz AJ et al 'Hospital characteristics and mortality rates', *New England Journal of Medicine* 1989; 321: 1720-5

This was an analysis of '30 day mortality rates' in 3100 United States hospitals. The '30 day mortality rate' was not defined, but presumably was death within 30 days of

either admission or discharge. This would compensate for differing lengths of stay in hospitals. Instead of being analysed by size, the hospitals were categorised according to their characteristics, in particular whether they were public, private 'non-profit' or private 'for profit' and whether they were teaching hospitals. After attempting to adjust for the different socio-economic characteristics of the mix of people using the different types of hospitals, higher adjusted mortality rates were found in osteopathic, private 'for-profit' and public hospitals.

It is not clear how relevant this distinction is to the NHS. Furthermore, the analysis groups all types of admission for whatever reason together even though they must differ widely in the risks of dying associated with them. The authors state that 'few deficiencies in medical care result in death'. This is not the same as saying that deaths do not result from these deficiencies, but expresses the view that only a small proportion of them lead to death. To do crosschecks, they looked first at the information that was provided about each patient and then at the proportion of each hospital's cases funded publicly by Medicare that were found to have problems with the quality of care. It was found that these were correlated, although not very highly, with the adjusted mortality rates.

Conclusions

The authors of all the papers are appropriately cautious and tentative in interpreting the results of their analyses and are very candid about their limitations. The findings are neither sufficiently clear cut nor sufficiently relevant to justify the sweeping statements in the consultation documents quoted above, which were apparently based on the findings. Thus they do not justify the centralisation of acute in-patient services in North West Hertfordshire. In particular:

1. Most of the studies compare the characteristics and the total amount of work done by hospitals rather than the volume of work done by individual doctors.
2. Many of the studies are concerned with regionalisation, rather than the sizes of hospitals with similar functions, which is the issue in North West Herts.
3. Most studies are restricted to analyses of mortality. There is little research on other relevant measures, in particular the extent to which operations or procedures achieve their intended result.

4. Many areas of health care in general and some types of acute in-patient care in particular are not covered, as the studies tend to cover six main areas of acute care.

5. Even given these limitations, there is no association between mortality and 'hospital volume' or, when measured, 'clinician volume', for many procedures, although there is for some. Where associations exist, interpretation is not clear cut and may have implications for the particular procedure which do not apply more generally.

6. It would not be surprising if doctors do some things better if they do them more often, but it does not follow that doing them all in one larger hospital gives doctors more practice than doing them in more than one smaller hospital. Although there is mention of doctors working in more than one hospital this question is not analysed in any of the papers.