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REVIEW

# Effect of Hospital and Surgeon Volume on Patient Outcomes Following Treatment of Abdominal Aortic Aneurysms: A Systematic Review

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## KEYWORDS

Abdominal aortic aneurysms;  
Surgeon volume;  
Hospital volume;  
Mortality;  
Morbidity

**Abstract Objectives:** This systematic review assessed the efficacy of centralisation for the treatment of unruptured and ruptured abdominal aortic aneurysms. Patient outcomes achieved by low and high volume hospitals/surgeons, including morbidity, mortality and length of hospital stay, were used as proxy measures of efficacy.

**Design:** Systematic review was designed to identify, assess and report on peer-reviewed articles reporting outcomes from unruptured and ruptured abdominal aortic aneurysms. No language restriction was placed on the databases searched.

**Materials:** Only peer-reviewed journals articles were included.

**Methods:** To ensure the contemporary nature of this review, only studies published between January 1997 and June 2007 were sought. Studies were included if they reported on at least one volume type and patient outcome.

**Results:** Twenty two studies were included in this review. In the majority of group assessments, the number of studies reporting statistical significance was similar to the number of studies reporting no statistical significance.

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**Conclusion:** The paucity of studies reporting statistically significant results demonstrates that although this evidence exists, its potential to be overstated must also be taken into account when drawing conclusions as to its efficacy for twenty first century healthcare systems.

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## Introduction

Centralisation is a term used to describe a reconfiguration of the provision of hospital-based surgical services, the ultimate goal of which is to reduce the amount of preventable deaths which occur by concentrating complex surgical procedures in specific hospitals. There are a number of concepts that are fundamental to the understanding of centralisation, including 'procedure volume', 'practice makes perfect' and 'regionality'.

Procedure volume, or more simply 'volume', refers to the amount of a specific surgical procedure performed by either a hospital or surgeon, and can be defined in relation to any type of surgical procedure. In this systematic review, hospital and surgeon volume are defined in relation to the treatment of unruptured and ruptured abdominal aortic aneurysms.

Centralisation assumes that in any area there are hospitals or surgeons who perform either a high or a low volume of particular surgical procedures (such as procedures for the treatment of unruptured and ruptured abdominal aortic aneurysms). Therefore hospitals and surgeons can be defined as high or low volume.

Based on this definition, centralisation presumes that hospitals/surgeons that perform a high volume of procedures will have good patient outcomes, while those who

perform a low volume will have poorer outcomes. This presumption is easily understood in the adage 'practice makes perfect'.

Each of the aforementioned concepts is commonly reported in centralisation studies; however their relationship with 'regionality' is seldom mentioned. Centralisation assumes that in any region there are hospitals/surgeons that perform either a high or low volume of procedures. Similarly, centralisation assumes that in this same area there are hospitals/surgeons that have either good or poor surgical outcomes. Volume and surgical outcomes are inextricably linked to the region in which they are observed.

The aim of this systematic review was to assess the efficacy of centralisation for the treatment of unruptured and ruptured abdominal aortic aneurysms. Patient outcomes achieved by low and high volume hospitals/surgeons, including morbidity, mortality and length of hospital stay, were used as proxy measures of efficacy.

## Methods

### Literature search strategy

A systematic search of the following databases was conducted: The Cochrane library, Current Contents Connect,

**Table 1** Summary of included unruptured abdominal aortic aneurysm studies.

Study	Volume type	Number of patients	Time period
Birkmeyer (2002) <sup>4,a</sup>	Hospital	TTL = 140,577	1994–1999
Birkmeyer (2003) <sup>5,a</sup>	Hospital and Surgeon	NR	1998–1999
Birkmeyer (2004) <sup>6</sup>	Hospital	NR	2000
Birkmeyer (2006) <sup>7,a</sup>	Hospital	TTL = 95,295	1994–2001
Dardik (1999) <sup>8</sup>	Hospital and Surgeon	TTL = 2335	01/1990–12/1995
Dimick (2002b) <sup>9,b</sup>	Hospital	U = 11,855 TTL = 13,887	1996–1997
Dimick (2003) <sup>10</sup>	Hospital and Surgeon	TTL = 3912	1997
Dimick (2003b) <sup>1,b</sup>	Hospital	TTL = 11,863	1996–1997
Goodney (2003) <sup>11</sup>	Hospital	TTL = 54,776	1994–1999
Holt (2007) <sup>3</sup>	Hospital	TTL = 15,515	01/04/2000–31/03/2005
Huber (2001) <sup>2</sup>	Hospital	TTL = 16,450	1994–1996
Manheim (1998) <sup>12</sup>	Hospital	U = 35,130 TTL = 42,457	1982–1994
Sollano (1999) <sup>13</sup>	Hospital	TTL = 9847	1990–1995
Trivedi (2006) <sup>14</sup>	Hospital	TTL = 21,287	1998–2001
Tu (2001) <sup>16</sup>	Hospital and Surgeon	TTL = 5878	01/04/1992–31/03/1996
Urbach (2003) <sup>15</sup>	Hospital	TTL = 6279	01/04/1994–31/04/1999

U-unruptured; TTL-total; NR-not reported.

<sup>a</sup> Overlap of study cohorts, Birkmeyer (2002; 2003; 2006).

<sup>b</sup> Overlap of study cohorts, Dimick (2002b; 2003b).

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