A systematic review and critique of the literature relating hospital or surgeon volume to health outcomes for 3 urological cancer procedures


CRD summary
This review determined the relationship between hospital or surgeon volume and health outcome in patients undergoing radical surgery for urological cancer. The authors concluded that outcomes for radical prostatectomy and cystectomy are likely to be improved if performed at high-volume hospitals and by high-volume surgeons, but the evidence for radical nephrectomy is unclear. The conclusions are likely to be reliable.

Authors' objectives
To determine whether hospital or surgeon volume affects the health outcome of patients undergoing radical surgery for cancer of the bladder, kidney or prostate.

Searching
MEDLINE, EMBASE, HMIC and the Cochrane Library were searched for eligible articles; the search terms were reported. Bibliographic references were also checked, and additional electronic searches on key authors were conducted for relevant publications.

Study selection
Study designs of evaluations included in the review
Studies that provided empirical data on a relationship between health outcomes and health care provider were eligible for inclusion.

Specific interventions included in the review
Studies describing health care provider volume (hospital or surgeon) for radical surgical treatment of the bladder, kidney or prostate were eligible. Studies were excluded if they were not community based, or if data from more than two health care providers were not extracted.

Participants included in the review
Patients undergoing radical surgery for cancer of the bladder, kidney and prostate were eligible. Health care providers from across North America were included in the review. Health providers were categorised into groups representing very low, low, medium, high and very high volume. The definitions of the various categories were not provided.

Outcomes assessed in the review
The majority of the studies assessed mortality (including hospital mortality and 30- or 60-day mortality) as their primary outcome measure. The rate of rehospitalisation and length of stay were assessed in the cystectomy and nephrectomy studies, whereas studies of prostatectomy examined potency, stricture and continence rates.

How were decisions on the relevance of primary studies made?
Two reviewers independently selected the primary studies. Any disagreements were resolved by a third party.

Assessment of study quality
Methodological quality was discussed on an individual study basis. The authors did not state how the papers were assessed for quality, or how many reviewers performed the quality assessment.

Data extraction
Two reviewers independently extracted the data from the primary studies. Any disagreements were resolved by a third party. In addition, to primary outcome variables and volume categories, data were extracted on data source, period studied, procedure type, number of patients and case-mix score. The case-mix scores are defined as 0 (no case mix adjustment), 1 (adjustment for demographic variables), 2 (adjustment for demographic variables and co-morbidities) or 3 (adjustment for demographic variables, co-morbidities and disease severity).

**Methods of synthesis**

**How were the studies combined?**
The studies were tabulated and combined in a narrative, grouped by health care provider (hospital or surgeon) volume.

**How were differences between studies investigated?**
The studies were separated by surgical procedure (radical prostatectomy, radical cystectomy and radical nephrectomy).

**Results of the review**

Eleven studies with more than 300,000 participants were included in the review.

**Hospital volume.**

There were 4 studies on radical prostatectomy. Two out of 3 studies found a statistically significant reduction in mortality rates with increasing hospital volume; 1 study found no difference in mortality rates.

There were 4 studies on radical cystectomy. One study demonstrated a statistically significant decrease in mortality with increasing hospital volume, while 2 studies showed a non significant decrease in mortality.

There were 4 studies on radical nephrectomy. No consistent relationship between mortality and hospital volume was found: 1 study found a statistically significant decrease in mortality with increasing hospital volume, 1 study showed no difference, and 1 study found an increase.

**Surgeon volume.**

There were 3 studies on radical prostatectomy. One study demonstrated a statistically significant reduction in mortality with higher surgeon volume, while another demonstrated an increase in mortality although this was not statistically significant. Two studies found improved outcomes, including post-operative and longer term complications and length of stay, with increasing surgeon volume.

There was 1 study of radical cystectomy. A statistically significant decrease in mortality was shown with increasing surgeon volume.

**Combined hospital and surgeon volume (3 studies).**

One study found small but statistically significant reductions in mortality after radical cystectomy in hospitals and surgeons with greater volume. Another study found that after radical prostatectomy, outcomes other than mortality were significantly improved with high-volume surgeons when hospital and surgeon volume were included in the same model. The final study demonstrated that post-operative complications and later urinary complications were reduced in high-volume hospitals with high-volume surgeons.

**Authors' conclusions**

Urological cancer outcomes for radical prostatectomy and cystectomy are likely to be improved when procedures are performed at high-volume hospitals and by high-volume surgeons. The evidence for radical nephrectomy was less clear.

**CRD commentary**

The review question was supported by clear inclusion and exclusion criteria. Several relevant sources were searched for studies. However, the authors did not report whether their search was restricted by language, thus it is possible that
relevant studies could have been missed and bias introduced. Appropriate procedures for selecting the primary studies and extracting the data were reported, thus minimising the possibility of reviewer error or bias. The quality of the primary studies was not systematically assessed, although methodological limitations were discussed on an individual basis.

The authors acknowledged that the data reported in the primary studies were obtained indirectly, primarily through Medicare or Medicare-linked databases. Consequently, there were some limitations in the methods of adjustment for disease stage and co-morbidity. In addition, data from studies utilising a Medicare source were limited to patients aged 65 years or older and/or a population with low income. Heterogeneity between the studies in the definitions of volume categories and the outcomes used precluded a quantitative synthesis. The studies were therefore combined in a narrative form, which was appropriate. This is a reasonably well-conducted review and the authors’ conclusions appear to follow from the data presented.

**Implications of the review for practice and research**

Practice: The authors did not state any implications for practice.

Research: The authors recommended that future studies should continue to examine the volume-outcome relationship, preferably in health care systems outside the USA, and that researchers should look at selective referral and confounding as possible alternative explanations. The authors also suggested that future studies appropriately adjust for disease severity and co-morbidity. Longitudinal studies are recommended once volume-based policies have been implemented.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.