Health Policy Research Program
Summary of Research Results

Title:	**The Organization of Health Care Services for Children and Youth: Synthesis of the Evidence to Help Guide the Integration and Consolidation of Pediatric Health Services**
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Summary

Over thirty years ago, the volume-outcome relationship was put forth as an explanation for varying health outcomes. The volume-outcome relationship refers to the concept that the more often a procedure is performed or a type of patient is treated, the physician and hospital will gain proficiency and expertise in their treatment. In an attempt to explain the volume-outcome relationship, two theories have been developed. The "practice makes perfect" theory states that repetition of procedure and type of patient improves outcome. The "selective referral" theory states that patients are referred to physicians with superior outcomes and the increased patient referral increases a physician's volume of patients. In order to accurately determine how volume influences outcome, the patients' risk for poor outcomes must be standardized or adjusted. We systematically reviewed 106 studies that examined how volume or regionalization of health services affected patient outcomes or utilization of health services.

A medical librarian conducted electronic searches in the five following bibliographic databases: Medline, EMBASE, Cinhal, HealthStar, and Web of Science. Two reviewers independently screened the search output and the full text of potentially relevant studies was obtained. Two reviewers applied the inclusion criteria to 1,213 studies. Studies were included if they examined a volume-outcome relationship or evaluated the impact of regionalization of services in a pediatric population. The study must have included a comparison group and have measured objective outcomes such as mortality, length of stay, or admission rates. Third, the participants had to be either: facilities or healthcare workers delivering pediatric health services, or any provider of child health (including governmental, non-governmental, or private organizations). Eighty-seven studies were

deemed relevant. An additional ten studies were identified from conference proceedings or reference lists of included studies. Writing to authors of included studies identified another nine studies. Quality was assessed independently by two reviewers. Two techniques were used to evaluate studies for their methodological rigor, Downs and Black's checklist for randomized and non-randomized studies of health care interventions and the degree of risk adjustment for different levels of case-mix. Data was extracted by one reviewer and checked for accuracy and completeness by a second. Due to great amounts of heterogeneity, a quantitative analysis could not be undertaken.

The clinical areas studied were: appendicitis (n=2), cancer (11), cardiac (12), level of care (23), neonatal (28), NICU (8), PICU (7), transplant (3), trauma (7), and miscellaneous (5). The median quality index was 21 (inter-quartile range 18,22), and the majority of studies were conducted in the United States. The quality of the studies improved over time.

There was inconclusive evidence for a volume-outcome relationship for the management of appendicitis. Survival in children diagnosed with cancer tended to increase when they were treated at high volume oncology treatment centres, however this was dependent on the type of cancer being studied. Children also tended to have better outcomes when treated in pediatric oncology centres versus other types of treatment institutions. Volume was also positively associated with outcome for children requiring organ transplants. A volume-outcome relationship existed for children undergoing a breadth of cardiac surgeries; regionalization of cardiac care also improved health outcomes. Increased level of care resulted in improved survival for low birth weight and high-risk neonates. For NICU and PICU settings, volume was not related to improved outcome, however patients treated in institutions with a high level of resources had better health outcomes than their counterparts treated in basic hospitals. Increased volume did not improve outcome in the trauma settings, however it is unclear if increased resource availability or treatment in pediatric trauma centre affects patient outcome.

The volume-outcome relationship appears to exist in most settings examined, but seems to be dependent on the procedure being performed or the particular pediatric speciality. Children with a high risk of dying appear to fare better in high volume and/or high level of hospital. The critically ill pediatric population (i.e., admission to an intensive care) or severely ill or premature neonates have improved outcome when treated in resource intensive hospitals. There is also a volume-outcome relationship for most pediatric surgical procedures examined.

Based on the evidence reviewed, the outcome for surgical procedures is generally more favourable in high volume hospitals. However, this does not apply to all surgical procedures, and is more evident in complex and rare operations. Because resource availability appears to be a larger predictor of health outcome than volume, severely ill children fare better in institutions with an increased level of resources. Finally, the outcome for high-risk pregnancies and premature babies is improved when delivered in Level III hospitals. For trauma management and delivery of babies, a well-developed

transportation system is required to shuttle patients to the hospital that matches their required level of resource.

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