The term "evidence-based medicine" was first coined by Sackett and colleagues[1] as "the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients." The key to practicing evidence-based medicine is applying the best current knowledge to decisions in individual patients. Medical knowledge is continually and rapidly expanding and it is impossible for an individual clinician to read all of the medical literature. For clinicians to practice evidence-based medicine, they must have the skills to read and interpret the medical literature so that they can determine the validity, reliability, credibility and utility of individual articles. These skills are known as critical appraisal skills. Generally, critical appraisal requires that the clinician have some knowledge of biostatistics, clinical epidemiology, decision analysis and economics as well as clinical knowledge.

The Canadian Association of General Surgeons and the American College of Surgeons jointly sponsor a program entitled "Evidence-Based Reviews in Surgery (EBRS)," supported by an educational grant from Ethicon Inc and Ethicon Endo Surgery Inc. The primary objective of this initiative is to help practicing surgeons improve their critical appraisal skills. During the academic year, eight clinical articles are chosen for review and discussion. They are selected not only for their clinical relevance to general surgeons but also because they cover a spectrum of issues important to surgeons; for example, causation or risk factors for disease, natural history or prognosis of disease, how to quantify disease (measurement issues), diagnostic tests and the diagnosis of disease, and effectiveness of treatment. Both methodologic and clinical reviews of the article are performed by experts in the relevant areas and posted on the EBRS website; a listserve discussion is held where participants can discuss the monthly article. Fellows and candidates of the College can access Evidence-Based Reviews in Surgery through the American College of Surgeons website (www.facs.org). All journal articles and reviews are available electronically through the website. We have a library of articles and reviews dating back to October 2000, which can be accessed at any time. Each October a new set of articles and reviews are available each month until May. Surgeons who participate in the current (modules) packages can receive CME credits by completing a series of MCQ. For further information about EBRS the reader is directed to the ACS website or should email the administrator, Marg McKenzie at mmckenzie@mtsinai.on.ca.

In addition to making the reviews available through the ACS and CAGS websites, 4 of the reviews are published in condensed versions in the *Canadian Journal of Surgery* and the other four will be published in the *Journal of the American College of Surgeons* each year.

REFERENCE

1. Evidence Based Medicine Working Group. Evidence-based medicine. JAMA 1992;268:2420–2425.

SELECTED ARTICLE: RURAL VERSUS URBAN INPATIENT CASE-MIX DIFFERENCES IN THE US

VanBibber M, Zuckerman RS, Finlayson SRG. J Am Coll Surg 2006;203(6):812–816.

REVIEWED BY

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ABSTRACT

Objective: To assess whether the scope and case-mix of surgical practices differ between surgeons practicing in urban vs. rural locations and would understanding case mix differences assist in the development of policies and programs to ensure adequate training of surgeons who practice in rural settings.

Design: Retrospective, descriptive comparison of inpatient general surgical procedures using data from the Nationwide Inpatient Sample (NIS). Rural vs. urban geographic descriptions were based on Rural-Urban Commuting Area (RUCA) codes developed by Rural Health Research Institute (hospitals were aggregated into three categories: urban, large rural town and small rural town). Surgical procedures were aggregated by the Clinical Classifications Software based on ICD – 9-CM procedure codes.

Results: Operations on the bowel, appendix and gallbladder constitute 61% of general surgical inpatient procedures in rural hospitals vs. 46% in urban hospitals. Compared with urban general surgery practices, rural practices include substantially fewer operations on the stomach and esophagus (6% vs. 11%), liver and pancreas (0% vs. 1%), spleen and thyroid (3% vs. 10%) and bowel (17% vs. 19%). General surgical procedures constitute only 42% of inpatient procedures in rural hospitals.

Conclusion: Rural and urban general surgical inpatient case-mixes differ from each other substantially. Additional training in a few surgical areas that are not currently emphasized in general surgical training could result in an increased role for general surgeons practicing in rural areas.

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Commentary: The training of general surgeons in North America typically occurs in tertiary centers under the supervision of surgeons who are trained and practice largely in a subspecialty area. Recruitment to more rural communities is hampered by a lack of role models for the true generalist surgeon and a concern that the broad based skills required in community practice are not taught in the "ivory towers" of the academic tertiary centers. Although it has long been anecdotally recognized that there are dramatic differences in the daily experiences of the traditional educators and the rural role models whom the educators hope to replicate, this simple fact has never formally documented. This study was designed to elucidate the differences in the array of procedures performed by surgeons in rural versus urban hospitals. The high-level clinical question addressed by this study is whether the scope and case-mix of surgical practices differ between urban and rural surgeons.

This specific question was addressed through a retrospective descriptive comparison of the nature of in-patient general surgical procedures performed at rural versus urban hospitals in the United States. The medical services assessed were in-patient general surgery procedures which were aggregated by the Clinical Classifications software (CCS) system. The source of the data was the Nationwide Inpatient Sample (NIS) database for the years 2000 and 2001. The data were available through the Healthcare Cost and Utilization Project administered by the Agency for Healthcare Research and Quality. Data elements were drawn from hospital discharge abstracts, which themselves are typically created for billing purposes. Hospitals were classified by linking American Hospital Association codes with the ZIP code and bed size of each hospital participating in the NIS. The data were further linked to rural-urban community designators of the Rural Health Research Institute to finally arrive at the categorizations into urban, large rural and small rural sites. Small rural hospitals were defined as those with 25 or fewer beds. They found that general surgical procedures accounted for 42% of inpatient procedures in small rural hospitals versus 25% in urban centers. Operations on the bowel, appendix and gall bladder comprised 61% of general surgical procedures in rural hospitals compared to 46% in urban hospitals. General surgical procedures that were performed with more frequency in urban hospitals included operations on the stomach, esophagus, liver, pancreas, spleen and thyroid gland.

While generated for another indication, the data are most likely valid for the intended purpose of this study. Administrative data are of questionable accuracy for reporting on outcomes or risk adjustment, but would be expected to accurately reflect the nature of surgical procedures for which patients were admitted to hospital. It is a separate question as to whether the data are valid for determining differences in all surgical procedures performed by general surgeons in the two different settings and likely would vary depending on the surgical procedure or organ concerned. Although the authors mentioned the potential limitation of not including out-patient surgical procedures, they did not feel the absence of these data was a major concern. But this is presumptuous, recognizing that ever greater volumes of skin, diagnostic laparoscopy, hernia, breast, and gallbladder surgery (procedures that constituted 55% of rural and 49% of urban in-patient procedures) are being performed as out-patient procedures every year. While one can likely assume that the difference in the number of cases of esophageal and pancreatic surgery is valid, one must be cautious about the relative total numbers of cases of the afore-mentioned procedures performed in all settings (in-patient and out-patient). Further, the omission of outpatient procedures from the analysis may significantly underestimate the importance of endoscopic, urologic (example vasectomies) orthopaedic hand (example carpal tunnel release) and other miscellaneous simple general surgical procedures in the case-mix of the rural surgeon, Finally, the authors also acknowledged that they only considered the procedures performed and not the specialty of the surgeon performing them. Many rural general surgeons may already be performing obstetric, gynecologic, orthopaedic, urologic, vascular and head and neck procedures, whereas these procedures are performed by sub specialists in other locales.

Overall though, the differences in the rates of surgical services performed were statistically significant. The results appear to confirm and quantify what has been perceived for some time; i.e. that there are significant differences in the types of operations performed in US hospitals, depending on degree of urbanization. Whether these results are clinically significant is not possible to determine with this type of study. Looking at small area variation (SAV) does not allow one to know whether individuals are receiving the correct or necessary care, or whether excessive surgery is being performed. Without knowing the true needs of the population, how much surgery is performed on an outpatient basis, and what the appropriate rate of surgery is, conclusions about the appropriateness of care cannot be made.

The most likely explanation for the differences in rates of surgical procedures performed in urban and rural locations is that there is increased specialization and concentration of specific and complex processes in certain urban locations. There is increasing evidence that concentrating complex care in certain locations where surgeons are experienced in

complex procedures leads to better outcomes for those conditions whether it be trauma, hepatobiliary, or esophageal surgery. Specialized urban centers also have greater populations by definition and thus can attract a higher volume of patients requiring complex but infrequent operations. Typically, the usual reason that surgical procedures are performed relates to the availability of surgical services. It is not possible to truly know whether surgical services were necessary or applied appropriately. Different rates might relate to differences in the population or patients being referred from rural to urban centers for such surgery. The NIS database collected data on where the surgery occurred, not where patients lived.

The authors concluded that rural and urban general surgical inpatient case-mixes differ substantially. They have provided a simple and straightforward answer to a complex question, which was whether the case mix differed in rural and urban locations. This study does highlight the important variations in surgical practice related to community size. Although the current study did not propose any concrete solutions, its importance lays in the clear demonstration of case-mix differences in general surgical practice according to location. Awareness of these differences may allow for rational decision making as changes in general surgery education are considered. For surgical educators and health care planners who are interested in fulfilling their social contract to provide surgeons with skills appropriate to the communities they serve, they would be well advised to consider this expanding literature.