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Surgeons and big data

In a Perspectives paper titled '*Administrative data*: *what surgeons should know about big data*' in this current edition of the *ANZ Journal of Surgery*, Hong *et al.*[1] have challenged and warned surgeons not to be dismissive of or uninvolved in administrative data collected by health institutions and health departments, that is, so-called big data. Health departments, regional health authorities, hospitals and many other health-related institutions increasingly have the ability to collect large volumes of statistical data including, for example, information relating to patient demographics, disease demographics, length of patient stay, hospital bed usage and the financial costs of providing specific services.[2,3] Performance measures and health outcomes can now be calculated and compared between regions and individual hospitals and, undoubtedly if authorized, these comparisons could potentially be made between individual surgeons.

Our transition into a world dominated and directed by information technology has undoubtedly facilitated this increased capability to collect and analyse data, and this will no doubt be further enhanced by the increasing utilization of electronic medical record systems by many hospitals and which will further enable input into the big data environment.[4,5] Whereas administrative data have been previously predominantly utilized for the purposes of recording patient demographics and analysing overall hospital efficiencies, by extending its data linkage fields into areas such as radiology and pathology, administrative data increasingly can potentially provide more meaningful information than purpose-specific clinical databases which have traditionally been the domain of various medical bodies and professional societies but often conducted in a rather fragmented fashion.[2] However, there is an emerging evidence that big administrative databases may be at least as good as clinical databases for purposes of performance monitoring, audit, case finding and research.[3] Administrative data have the advantage that it is collected in a regulated and mandatory fashion and readily captures large patient population information in a cost-efficient manner.

It is therefore critical that surgeons and clinicians actively participate in the quality of the information being collected and its subsequent analysis and interpretation. There are excellent examples of surgeon and clinician involvement in big data management. The RACS Clinical Variation Working Party is undertaking a collaborative analysis of Medibank statistics to study variations in surgical outcomes for a variety of procedures so that we can have a better understanding of what drives variation in healthcare practices.[6] Another example of administrative data oversighted by effective clinical supervision and interpretation is the Queensland Cancer Control Analysis Team (QCCAT)[7] which represents a partnership between the Queensland Health Department and various clinical oncological groups. The American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP®)[8] is a nationally validated, risk-adjusted, outcome-based programme to measure and improve the quality of surgical care in the private sector. NSQIP is a large surgeon-directed and audited database which has been demonstrated to reduce the number of perioperative complications and provides feedback to health insurance companies, which are generally hesitant to pay for complications, as to what is an acceptable standard of care. Similarly, the ANZASM programme[9] established and conducted by the RACS is a nationally based audit of mortality which has also been shown to have significant benefits in terms of improving patient care. ASERNIP-S,[10] functioning under the auspices of the RACS Research and Evaluation incorporating ASERNIP-S committee, conducts reviews and meta-analyses of data for various government bodies and health institutions and therefore provides not only clinicians but also administrators and non-clinicians with the appropriate insight on numerous health issues.

Therefore, as Hong *et al.*[1] have highlighted, surgeon involvement in health data evaluation is vital. It is essential that surgeons have engagement in the collection of health institution statistics and be represented on committees analysing and interpreting big data so that this information is viewed in a proper clinical perspective. In doing so, surgeons can influence the direction of healthcare policies and ensure that the best and most efficient quality outcomes for patients can be achieved. It would also be important that surgeons ensure that data collected by health authorities and hospital groups are not used in a misguided way to attempt to publically rank or score-card individual surgeons or surgical units, an exercise which would be replete with contention.

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Ian C. Bennett, MBBS, FRACS, FACS
Princess Alexandra Hospital, The University of Queensland, Brisbane, Queensland, Australia

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Collaborate or treat intra-abdominal metastatic colon cancer of the liver and peritoneum: which is practical for the colorectal surgeon?

The goals in the treatment of colorectal cancer are to prolong survival with an acceptable quality of life, and at a reasonable cost. Evolution in the management of locally advanced, recurrent and metastatic disease from colorectal cancer has led to a substantial proportion of patients undergoing more aggressive treatment strategies involving extensive surgery, adjuvant chemotherapy and radiotherapy.

Liver metastases and peritoneal carcinomatosis are more readily detected preoperatively due to improved accuracy of, and greater access to, imaging modalities.[1] Since Munnell demonstrated a significant survival benefit following metastatic tumour debulking for ovarian carcinoma in the 1960s,[2] the concept of successful removal of intra-abdominal metastatic tumour from the liver[3,4] and peritoneum[5] has become established.

Up to 50% of patients with colorectal cancer will develop peritoneal metastases,[6–9] with a universally fatal outcome if untreated. The 5-year survival after cytoreductive surgery and heated intraperitoneal chemotherapy (HIPEC) in selected patients is 30–40%.[10–12] A similar proportion of patients will develop liver metastases;[13] surgical resection of liver metastases is now routine and carries a low morbidity, with 5-year survival of 50–60%.[3]

The surgical approach to peritoneal metastases is still evolving. The concepts of cytoreductive surgery and HIPEC are biologically plausible but a number of factors have as yet impeded widespread clinical implementation. Randomized surgical trials are always difficult to accomplish in patients with complex metastatic disease, and lack of randomized data has been a factor preventing acceptance of peritonectomy as a standard of care. Questions remain over the timing of surgical and adjuvant treatment, the role of systemic chemotherapy, a standardized means of disease quantification and the basis of patient selection for treatment.

In this issue of the journal, two papers address the surgical management of metastatic abdominal colorectal cancer. In a very well-presented review article, Behrenbruch *et al*. raise a number of issues which highlight the complexity of peritonectomy and HIPEC.[14] Accurate selection of patients is critical in order to achieve survival outcomes which acceptably offset the significant morbidity associated with peritonectomy. Unfortunately, preoperative staging of metastatic disease severity is disappointingly inaccurate and laparoscopy or laparotomy with frozen section confirmation is still required. Resection of disease leaving no residual macroscopic tumour is essential to achieve good survival rates, and this may necessitate removal of involved small and large bowel, with consequent enterocutaneous fistulae or anastomotic leaks in the presence of HIPEC.[15]

Several ongoing studies will address surgical morbidity versus survival:[16] the French PRODIGE-7 trial assesses the potential benefit of HIPEC over cytoreductive surgery alone, the ICARUS trial in the USA compares HIPEC with early post-operative intraperitoneal chemotherapy and the PRODIGE-15 trial assesses surveillance alone versus laparotomy and HIPEC at 6 months after primary curative resection. A more recent proposal is the use of prophylactic HIPEC at the time of curative resection of the primary tumour where there is a high risk of peritoneal relapse, currently being assessed in the Dutch COLOPEC trial.[14,16]

Also in this issue, Walker *et al*. review the use of intraoperative ultrasound to more accurately detect liver metastases, with a view to synchronous resection of lesions not detected on preoperative magnetic resonance imaging and positron emission tomography scan.[17] At present, there are very few colorectal surgeons trained in intraoperative liver ultrasound or in using HIPEC, and use of these modalities at the primary procedure requires the availability of peritonectomy and liver surgeons, which is impractical to coordinate even in hospitals where such surgeons work and impossible in other hospitals. Time pressures do not easily permit such collaboration.

Whether the future colorectal surgeon or trainee will learn these techniques or will be able to arrange a system of collaboration for combined operative management remains to be seen. The writers of this Editorial believe that learning to quantify the extent of abdominal metastatic disease is essential for the colorectal surgeon, and that major cytoreductive surgeries and HIPEC as well as intraoperative liver ultrasound will remain the province of specialized peritonectomy and liver units. Either way, colorectal surgeons will need to adapt to accommodate these advancements in the treatment of this disease.

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