Synoptic surgical reporting for breast cancer surgery: an innovation in knowledge translation

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Abstract

BACKGROUND: Extensive literature identifies that the quality of surgery not only influences morbidity and mortality but also long-term survival and function. This mandates that we develop a system to capture this information on a real-time basis.

METHODS: A synoptic surgical template for breast cancer was created; this was digitized and made available to all surgeons in Alberta.

RESULTS: The data reference 1,392 breast cancer procedures. Ninety-one percent of reports were submitted within 1 hour and 97% of reports were submitted within 24 hours. Fifty-two percent of reports were completed within 5 minutes. Information quality with respect to completeness of staging information was present in 89%. Eighty-four percent complied with practice guidelines and 89% of breast surgeons adopted the template. Seventy-five percent of users were moderately or highly satisfied with the system.

CONCLUSIONS: The experience with the development and implementation of synoptic surgical reporting has proven to be a successful tool for generating quality surgical data.

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KEYWORDS: Alberta WebSMR; Synoptic; Surgical report; Outcomes

Extensive literature clearly has documented that outcomes of surgically treated cancer patients are linked with quality of surgery.¹⁻³ These include not only reduced surgical morbidity and mortality but also now improved survival and quality of life.⁴⁻⁵ The volume of a procedure, either by hospital or by the surgeon, is identified repeatedly as a surrogate of quality.¹⁻⁶⁻⁷ Unfortunately, this indicator can be applied only as a general observation and frequently fails when applied to individual high- or low-volume providers. There are many other possible explanations for better outcomes related to volume such as education, experience, or training, but these do not address the real issue of defining the actual surgical processes, which should be the key to any outcomes analysis.⁸ Indeed, a surgical operation consists of the sum of interactions of many variables including the biology of disease, the health circumstances of the patient, and the resources available, all intertwined with the surgeon’s judgment and skill. Capturing these relationships can provide a valuable resource for the health care system and represents an effective tool for knowledge translation.

Our solution to this challenge has been to replace the traditional narrative used for a surgical record with a syn-
optic format. This article describes how the concept of synoptic reporting has become a reality in our province for breast cancer surgery. By using a digitized platform, accessed via the center’s web site, we have documented how the synoptic surgical template has changed the surgical report from a semiquantitative format to a scientifically standardized format. We herein show the utility of this format in our breast cancer patients, highlighting the clinical practice of breast cancer surgery in Alberta.

Methods

The breast cancer surgical template was developed by content experts in the province—general surgeons and surgical oncologists—from rural, urban, and university sites. By using a modified Delphi method the final elements and flow of the template were approved and piloted first on paper. The template then was converted to the electronic platform, using software that did not require any further programming skills.

The Alberta Web Surgical Medical Record (WebSMR) is a web application using HL7 messaging and Systematized Nomenclature for Medical Clinical Terminology (SNOMED CT), a Canadian and International standard, as well as a Sybase database and Microsoft.net using the web browser Internet Explorer. All Alberta hospitals were designated as trusted zones for using the WebSMR, which was hosted by a single server at the provincial agency (the Alberta Cancer Board). This required Privacy Impact Agreements to meet provincial standards and information agreements with each of the 9 regions. The synoptic report was accepted by the health regions as a legal equivalent to the narrative text report.

The discreet data points of the preoperative information, intraoperative procedure, and decision making are recorded entirely by using a mouse to select radial buttons and check boxes. Enhancements such as prefilled demographics, drop-down menus, automatic forwards, automatic staging, and risk factor calculators were incorporated (Fig. 1). In addition, text could be added for unusual situations that may arise, particularly in complex surgical procedures. On submission of the report with an electronic signature, it is printed for immediate placement in the chart. After a quality check, it is transferred to a provincial viewing platform, and/or faxed to all involved with the care of the patient: the referring physician, medical records department, cancer center, and the surgeon’s office.

The Breast Tumor Group held regular meetings to monitor and change the template as needed to reflect evolving or established guidelines. The Tumor Group also identified quality indicators that were updated for the individual surgeon and the entire province daily that could be viewed at any time. Outcome indicators included preoperative evaluations that were available at the completion of the procedure and were as follows: body mass index, methods of detection, metastatic work-up, clinical staging, decision making for breast cancer surgery with rates of breast conservation surgery, method of axillary staging, use of reconstruction, and intraoperative pathology consultation. Each participating surgeon, however, could view only the provincial aggregate totals and their own results, with no access to any other individual surgeon’s data. Provider efficiency was determined by measuring the time taken to complete a WebSMR record, defined as the time from logging on to the system to submission of the record. An independent evaluation was conducted using a predesigned framework including a modified Likert scale to determine both the impact and benefits of the system for surgeons, patients, and health regions.

In addition, various parts of the surgical report were linked to National Comprehensive Cancer Network guidelines that could be accessed at will by using a hyperlink. A medical dictionary of all terms formed part of the template that could be used if needed. The database included a data dictionary to establish consistency in data elements as changes were made to the template to capture the evolution of surgical practice. An automatic calculator was inserted for body mass index and clinical staging data with results appearing on the printed record for subsequent clinical use. In addition to the surgeon’s access to personal and provincial aggregate data, general outcomes of interest generated by the surgical record were reported to participating regions and the Cancer Board regularly.

Results

The Alberta WebSMR was launched in December 2005 for breast cancer in 3 regions and in June 2008 included 4 regions, covering more than two thirds of the population of Alberta. Currently, 31 of 35 surgeons performing breast surgery are using the template voluntarily, for a total of 1,392 invasive cancers as of June 2008. Ninety-one percent of reports were submitted within 1 hour and 97% were submitted within 24 hours. This includes review by the surgeon with the addition of an electronic signature, constituting the legal record. Fifty-two percent of reports were completed within 5 minutes, 26% within 5 minutes to 10 minutes, and 22% took longer than 10 minutes. The median time to complete 600 records was less than 5 minutes.

Breast cancers were identified by diagnostic imaging in 49%, by patient and family in 45%, and by physicians in 5%, with the remainder undetermined. For patients undergoing mastectomy, tumor size was reported as less than 2 cm in 37%, as 2 to 4 cm in 31%, and the remainder as greater than 4 cm. Clinically invasive tumors presented as stage I in 50%, as stage II in 38%, as stage III in 10%, and as stage IV in 2%. Pathologic invasive tumors presented as stage I in 50%, as stage II in 38%, as stage III in 10%, and as stage IV in 2%. Pathologic diagnosis was determined by fine-needle aspirate in 5%, core needle in 87.6%, needle localization in 2%, and open biopsy in 5.4%.

The overall percentage of breast conservation was 52%. However, only 68% of patients were candidates, of whom
Cancer Surgery Alberta

IMPROVING OUTCOMES

Patient Name: Ms X
ULI: 000000000
DOB: 1972-Apr-02
Org: FMC

TREATMENTS FOR BREAST CANCER
Was surgery delayed for any reason:
No delay (<30 days)

PREOPERATIVE ASSESSMENT
Current pregnancy: No
Past Personal History: None
Genetic Testing: None
Contraindications to radiotherapy: No
Patient candidate for breast conservation: Yes

PALPABLE LESION
Distance from Nipple: Peripheral

PREOP TREATMENT
Preop Treatment: No

METASTATIC WORKUP
Metastatic work up: Negative

BREAST SURGERY
Specify surgery: Unilateral
Specify side: Right
Current diagnosis: Invasive
Nipple removed: No

Breast surgery performed: Breast Conservation
Indications: Primary excision
Specify breast: Right

LYMPH NODE SURGERY
Unilateral lymph node surgery: Right breast
Lymph node surgery: Axillary node & sentinel node dissection
Preop lymphoscintigraphy: Yes
Number of nodes seen: 1
Site of nodes: Axilla
Localization Technique used: Technetium
Sentinel nodes: Clinically negative
Node 1: Radioactive
Counts ex vivo: 700

Intraoperative pathology assessment: Yes
Intraoperative path assessment method: Frozen section
Result: Positive

CLOSURE
Closure by plastic surgeon: No
Simultaneous contralateral surgery: None
Incision closure: Skin stitches buried, deep sutures
Sponge count complete/correct: Yes
Blood loss (cc): 100
Blood replaced: No
Drain site: Axilla
Drains used: Jackson-Pratt

Operative Report
Surgeon: Temple, Walley
Submitted: 2009-May-06
Date of Surgery: 2009-May-06

BMI: Normal (18.5-24.9)

Size of breast: Medium (B)
Method of detection: Patient/family
Palpable: Yes
Can be seen on: Mammogram, US, MRI
Preop Biopsy: Core Biopsy

Clinical Axillary Node Status: Negative
Other nodes: None
Clock Position: 9

Tests Done: Bloodwork, CXR

Invasive TNM: Unifocal
Size of Tumor: 2.6-2.9
Clinical Stage: II A

Skin excision with specimen: Yes
Depth of resection: To fascia
Margins checked by pathologist: gross assessment
If checked: negative
Centimeters clinically negative margin: 0.5-1

Needle localization: No
Clips in segmental site: No

Axillary dissection performed using: Same incision as breast surgery
Axillary vein seen: Yes
Latissimus dorsi identified: Yes
Latissimus cleared: Yes

Medial limits of axillary dissection identified:
Lateral border of pectoralis minor (level 1), medial border of pectoralis minor (level 2)
Serratus anterior identified: Yes
Serratus anterior cleared: Cleared

Comments: Sentinel node was positive by frozen section, complete ax. dissection performed

FOLLOW UP
Do you have follow up plans: Yes
By: Myself <1 month
Cancer Centre 1-6 months

Patient status: Stable
Unit transferred to: Recovery Room
Dressing applied: Yes
Needle count complete/correct: Yes

WJ Temple

Figure 1  Screen shot of final report.
77% received breast conservation surgery (BCS). Planned reconstruction for mastectomy patients was performed in a further 3%, for an overall breast preservation rate of 80% of those eligible. Breast implants were used in 59% of reconstruction and autogenous flaps in 33% and 8% other. Absolute and relative contraindications to BCS were noted in 57% of mastectomy procedures. Indications for mastectomy were reported as large tumors, multicentric tumors, recurrence, positive margins, previous radiation, and in 33% of patients owing to surgeon or patient preference, and no data were recorded in 10% of cases. Initial axillary staging by sentinel node dissection was used in 83% in BCS and converted to immediate axillary dissection in 12%; the remainder had only full axillary dissection. In mastectomy patients 48% underwent initial sentinel node dissection and 12% converted to axillary dissection. The sentinel nodes were identified by technetium alone in 70% of cases, in combination with dye in 25%, dye alone in 1%, and no data in 3%. Intraoperative pathology for the assessment of sentinel node by touch prep and frozen section were used in 90%, with no data in 10% of patients.

Information quality with respect to completeness of staging information was present in 89% of all breast cancer records. More than half of all breast cancer procedures were documented on WebSMR and 84% complied with practice guidelines. Seventy-five percent of users were moderately or highly satisfied with the system overall. Those not satisfied with the system cited information technology problems, esthetics (difficulty reading report and font size), and functionality, which eventually were addressed as experience accumulated.

Comments

The capture of high-quality data are critical to the knowledge transfer process. Entry of data at the point of care affords the physician an ideal way to enter the most accurate information possible. The electronic-based synoptic reporting system has shown a significant advance in recording surgical data that are in real time, accurate, and complete (Fig. 1). This provides a solid basis for scientific study of the biology of disease in relation to surgical interventions. Other systems using surrogate sources to date have not duplicated this. To have 97% of records completed and signed in 1 day and distributed to all involved health care facilities has created a new standard in efficiency and patient care.

Synoptic reports have been used in other specialties and we previously have reported our experience with a rectal cancer template.10 Edhemovic et al10 investigated the retrieval of specific data points from traditional narrative reports and WebSMR synoptic reports in rectal cancer procedures and found on average that the narrative report was missing 53% of this information compared with only 1% in the synoptic report. The most striking problem reported was that in 87% of cases there was a lack of intraoperative staging information and that the surgical technique of total mesorectal excision was described adequately in only 33% of cases.10 This mirrors a report of 1,131 ovarian cancer surgeries in which there was a lack of intraoperative staging information in 79% of stage I and 87% of stage II and III patients.11 One study on laparoscopic cholecystectomy procedures identified that perioperative factors and both qualitative and quantitative critical surgical details consistently were omitted from traditional narrative reports.12 Pathology studies have identified that synoptic reports capture 100% of the data in mandatory fields whereas narrative reports capture on average 80% of essential information.13,14 This emphasizes the problem of narrative reports, revealing that they more often reflect the highlights of the procedure rather than the essential routine information one needs to evaluate a procedure and measure outcomes. Based on these articles, the traditional narrative report appears no longer adequate to meet the needs of modern health care.

The most exciting attribute of this tool is the potential for knowledge transfer by determining exactly what a procedure entails and being able to analyze it on a real-time basis for short-term outcomes. In time, long-term outcomes with integration into discharge data, pathology, radiation, and medical oncology will be collected in a similar manner to make the system more sophisticated in its power. It will allow us to determine the complex interactions between medical infrastructure, physician, patient, and biology of disease. The realization that a surgical report can capture more than just surgical processes, including the perioperative details and management of the patient disease, dramatically increases its value. It also enhances the role of the surgeon in providing critical information needed to understand the epidemiology and biology of disease. The surgery now has become a quantifiable procedure. The format still allows for flexibility of the richness of the procedure, recording issues such as bleeding, complications, and unusual anatomic variations present, by the option of entering text).

The potential educational impact of this form of recording a procedure is enormous. Built into the surgical report are all the appropriate steps that one might encounter, including acceptable variations of practice (Fig. 2). This reminds and educates the surgeon that if steps were omitted in the previous surgery, they should be included in the next case. Items that have a guideline connected with them can be accessed at any time with a hyperlink. In this way, the educational component is integrated into the format both implicitly and explicitly. The synoptic system provides the opportunity to add a functional clinical staging paradigm that will become an important component of measuring quality (Fig. 3). This information is very difficult to extract postoperatively from cancer registries. The synoptic template eliminates this problem by recording the surgeon’s preoperative assessment at the time of surgery. The automatic calculation of TNM staging serves to confirm the decision making intraoperatively and also plans for postoperative management. The process of decision making for the
most part is an impossible piece of information to extract from any chart because the specifics are forgotten by the surgeon very quickly after the procedure. Once insight is gained into the decision-making process one can understand practical issues around the adoption of guidelines and this adds a precise tool for improving care and outcomes.

Outcomes that have been generated from the synoptic surgical report have created a provincial pattern that in effect creates our current standards. For example, sentinel node biopsy has become the standard since the last published Canadian guidelines were published in 2005, at which time the full axillary dissection was identified as the most appropriate procedure. However, the current National Comprehensive Cancer Network guidelines require the use of SLN for initial staging, which is consistent with the standard of care practiced in Alberta.

The information gathered provides a wide range of important data including the method of detection, method of diagnosis, follow-up plans, and suitability of patients for protocol and for tissue banking. For example, breast cancer tissue diagnosis now almost exclusively is performed by core biopsy radiological directed core biopsy or fine needle aspiration. This is a major shift in practice from open biopsy and complies with the current guidelines requiring that less than 20% of biopsies should be performed open. Despite a free screening program in Alberta for breast cancer, mammograms detected cancers in only 49% of patients. In addition, 45% were found by the patient, with only 5% found by the physician. These observations have a number of implications as to the efficiency of our screening programs and the efficiency of physician-detected breast cancer through routine visits. These are unique data for our provincial health care system and will be very useful in stimulating new strategies for improving detection.

The electronic synoptic record not only is extremely efficient in collecting data, but it also eliminates the cost associated with transcription services. The real cost savings, aside from transcription cost, is in the improved efficiency that enables timely information access and sharing with other care providers. The time saved by this format also is notable because templates have been found to improve consistency in documentation, lead to immediacy in availability, and resulted in better compliance with documentation.

The adoption of this methodology has been entirely voluntary. Among breast surgeons, 89% used the WebSMR. The electronic format was designed to be as time efficient as the narrative report, the average time to complete the report was less than 5 minutes and therefore was not an obstacle to the busy surgeon. Although we initially thought that surgeons would be concerned about the implications of collecting these data, it appears that surgeons did want to know how to improve their delivery of care by knowing both their own and their colleagues’ aggregate outcomes. The ability to have a daily update on quality indicators was the major incentive to participate. Having data analysis control and interpretation by a committee of one’s colleagues, with the ability to be part of the committee structure, was essential to provide assurance that the data would be analyzed appropriately. Surgeons also realized that analysis of practice information would be inevitable and is best performed by the provider. Ultimately, all preoperative and operative outcomes data were monitored by the Outcomes Committee for significant variations that would trigger educational efforts for the participants. The quality assurance aggregate data

Figure 2  Screen shot showing decision-making and preoperative data.

Figure 3  Screen shot showing automatic staging and risk factors.
then are reported to the Alberta Cancer Board to create transparency to the public and the health authorities.

Future developments are underway, such as linking with the pathology records, medical oncology records, and radiation records. Long-term outcomes data are being envisioned with involvement of family physicians and this will elucidate the biology of breast cancer further. These templates have been developed but full implementation will require an expansion of access to the electronic health record by all primary health care providers. The initial stages of adapting SNOMED CT standards to our template already have begun and will allow us to compare our data with other national and international reports. In addition, a discharge template that includes complications and time in hospital is ready to be initiated at our center.

Conclusions

In conclusion, this modality of reporting has tremendous implications for all surgery, not just breast cancer surgery. The concept that the surgical report can become a scientific document to be used for real-time quality improvement has been proven by Cancer Surgery Alberta and Alberta surgeons. No longer does the surgical report contain a great deal of uninterpretable and incomplete information that frequently is irrelevant to process quality in outcomes.

Although the major concerns of measuring surgical outcomes always has been quality assurance to create a minimum standard, this format provides us with the opportunity to introduce quality indicators to identify those factors that indeed influence the best outcomes. The digitized synoptic medical record likely will be the future of knowledge translation in the surgical management of the cancer patient.

References