Evaluating population-based breast cancer surgical practice in real time with a web-based synoptic operative reporting system


**KEYWORDS:** Breast cancer; Web-based synoptic operative reporting; Population-based

**Abstract**

**BACKGROUND:** A Web-based synoptic operative reporting system (WebSMR) incorporates implicit guidelines and real-time feedback of a surgeon’s practice compared with provincial data. This study compares rates of total mastectomy (TM) between the overall provincial and WebSMR patients and examines decision-making factors in WebSMR patients.

**METHODS:** Patients treated for invasive breast cancer (2007 to 2011) were identified from WebSMR and the Alberta Cancer Registry. Reports include surgery type and reasons for TM.

**RESULTS:** Among 5,787 patients in WebSMR (2007 to 2011), TM rate decreased from 48% to 42% ($P < .001$). In 2011, the provincial cancer registry recorded a 56% TM rate compared to 42% in WebSMR patients. Patient preference accounted for 36% in the latter group.

**CONCLUSIONS:** In WebSMR patients, TM rates were lower than the overall provincial rate and decreased significantly during the study period. Reasons are unclear, but guidelines and real-time feedback likely play a role.

Evidence-based guidelines are difficult to efficiently and effectively incorporate into practice.¹ These standards are captured in extensive publications, both online as well as in manuals, particularly in the field of cancer treatment. Adoption of these guidelines not only provides standardization of treatment saving enormous resources, but also improves patient outcomes significantly. In cancer surgery, a multidisciplinary approach to cancer treatment with access to standardized and evidence-based therapy has improved care.²⁻⁴

Unfortunately, despite significant investment, routine incorporation of guidelines into practice has been largely unsuccessful.¹ The publication of guidelines alone has been shown in one study in breast cancer surgery to have no measurable effect.⁵ More recently, strategies of concurrent feedback, reminder systems, and multiple interventions have been found to be effective in the adoption of guidelines.⁶

The implementation in Alberta in 2006 of Web-based synoptic operative reporting allows observation of guideline implementation in a unique manner with incorporation of real-time feedback and a reminder system that seamlessly integrate guidelines into the operative record.⁷⁻⁸ This study reports on the influence of introducing this knowledge transfer methodology and the change in the utilization of breast conservation operations for invasive breast cancer in a large health care jurisdiction over a 5-year period.

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The authors declare no conflicts of interest.

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Methods

A standardized operative synoptic template was created by Alberta general surgeons from rural, urban, and university sites using a modified Delphi technique. In parallel, functional software (Alberta WebSMR – Web Synoptic Medical Record) was developed to provide a hospital Web-based digitized synoptic template available to all surgeons in a province where all patients are treated in a single public health care system. This effort was supported by an administrative team with expertise in change management and was instrumental in the implementation and voluntary adoption of this tool. The synoptic format was approved as a legal record replacing the narrative record by the provincial health authorities as well as by the Canadian Medical Protective Association.

The synoptic template expanded the usual content of the narrative report from only documenting the technical procedures to also include data on risk factors, mode of presentation, staging work up, preoperative treatment, clinical stage, tumor banking, and plans for postoperative follow-up. It was felt that all information recorded was information the surgeon

Figure 1 View of WebSMR with contraindications to breast conserving therapy.
knew in order to perform the procedure. Importantly, the report was intended to capture decision making, for example, the decision to perform a mastectomy versus breast conservation treatment. The synoptic report also allowed for text entry if needed to supplement the record. The explicit guidelines were provided using National Comprehensive Cancer Network guidelines links that were accessible while the surgeon was completing the synoptic report.10 Items that were considered implicit guidelines were included in the decision-making algorithm when mastectomy was chosen including the following: (1) Are there contraindications to radiation therapy? (2) Is the patient a candidate for breast conservation therapy? (3) If mastectomy is chosen, identify the reason(s) – advanced or too large, multicentric, margins, occult tumor, previous cancer, recurrence, previous radiation, patient preference, and other with a text box (Fig. 1).

The proportion of breast conservation procedures versus mastectomy was calculated from the operative reports entered on the Alberta WebSMR from 2007 to 2011 inclusive. Comparisons were made using chi-square test to determine significant change in treatment patterns.

Information by surgeon or by site was not specifically analyzed. Furthermore, the use of immediate breast reconstruction was not specifically captured but is felt to represent <5% of the current cohort.

Results

The adoption of the WebSMR for breast cancer operations increased from 450 patients in 2007 to 1,523 in 2011. Using the cancer registry, it was identified that in 2011 there was a total of 1,950 breast cancers in Alberta. For the same year, the WebSMR data identified 78% of all invasive breast cancer operations in the province.

For surgeons reporting initial breast cancer procedures using the WebSMR, a change in practice was observed from 2007 to 2011. Breast conservation procedures significantly increased from 54% to 59% (P < .001) (Table 1). Conversely, the rate of total mastectomy (TM) changed from 46% to 41% with a high of 48% in 2008. During the overall time period, patient preference accounted for 36% of mastectomies with the remainder completed for relative contraindications including locally advanced (24.4%), multicentric (12.9%), close or positive margins (3.9%), prior irradiation (3.1%), and recurrence (1.5%). Recorded tumor size (T stage) did not significantly change over the same time period (Table 2). Similarly, the recorded clinical stage before operation did not significantly change over time.

Comments

The utilization of synoptic operative reporting for breast cancer was associated with a significant change in practice – an overall increase in the breast conservation rate over time. Many possible factors could account for this change over time. The incorporation of guidelines (explicit and implicit) may have a role. Although the explicit National Comprehensive Cancer Network guidelines within the synoptic report identified both mastectomy and breast conservation as equivalent, it did not promote either approach.10 Furthermore, implicit guidelines incorporated into the report were to remind the surgeon that breast conservation should be considered unless there was a documented reason not to do it. The surgeon had to give a rationale as to why breast conservation was not performed. Furthermore, the design of this synoptic template was determined at a consensus meeting of Alberta surgeons where it was recommended that in Stage 1 or 2 breast cancer patients, conservation surgery followed by radiotherapy is generally recommended in the absence of specific reasons for mastectomy. In comparison to the current study trends in breast conservation, during the same time period, the trend for TM in the United States has been increasing.

The proportion of women treated with conservation surgery

<table>
<thead>
<tr>
<th>Year</th>
<th>2007</th>
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<tr>
<td>Surgery</td>
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<tr>
<td>No. of patients</td>
<td>455</td>
<td>591</td>
<td>695</td>
<td>813</td>
<td>899</td>
</tr>
<tr>
<td>%</td>
<td>54</td>
<td>52</td>
<td>55</td>
<td>55</td>
<td>59</td>
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Table 1 Proportion of patients undergoing breast conservation surgery by year

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<tr>
<th>Year</th>
<th>2007</th>
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<tr>
<td>Surgery</td>
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<tr>
<td>No. of patients</td>
<td>394</td>
<td>541</td>
<td>567</td>
<td>665</td>
<td>624</td>
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<tr>
<td>%</td>
<td>46</td>
<td>48</td>
<td>45</td>
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<td>41</td>
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Total 849 1,132 1,262 1,478 1,523

*P < .001 chi-square test.

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<tr>
<th>Year</th>
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<tr>
<td>Tumor size (T stage) by year</td>
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<tr>
<td>Size (cm)</td>
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<tr>
<td>&lt;2</td>
<td>130 (58)</td>
<td>452 (55)</td>
<td>603 (57)</td>
<td>708 (55)</td>
<td>899 (59)</td>
</tr>
<tr>
<td>2–5</td>
<td>76 (32)</td>
<td>291 (35)</td>
<td>353 (33)</td>
<td>501 (39)</td>
<td>520 (34)</td>
</tr>
<tr>
<td>&gt;5</td>
<td>22 (9)</td>
<td>82 (10)</td>
<td>101 (9)</td>
<td>84 (6)</td>
<td>105 (7)</td>
</tr>
</tbody>
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*Not all patients had tumor size recorded as it was not a mandatory field.
increased from 59.9% in 2000 to 64.4% in 2005 and then significantly decreased to 61.6% in 2008.11

The 2nd factor potentially influencing practice is the access to real-time outcomes that can be reviewed by the surgeon at any time.7 The specific metric of conservation surgery rate is calculated within 24 hours of an operative report entered and displays both the surgeon’s and provincial aggregate data for the practice across Alberta. It is displayed both as a total percentage and analyzed year by year. The individual influence of real-time outcomes, explicit guidelines, and implicit guidelines cannot be calculated, but we believe that the seamless incorporation of implicit guidelines reminding the surgeon with every report is the most influential in surgical decision making. The absolute change in breast conservation rate of 5% initially appears modest; however, the relative change in those who were amenable to breast conservation therapy is more remarkable. Only one third of remaining patients receiving a mastectomy were eligible for breast conservation surgery since the others had contraindications.

The overall breast conservation rate in Alberta using the Alberta Cancer Registry data from 2007 to 2010 was reported at 44%. This contrasts to those who voluntarily adopted the Alberta WebSMR where the average was 55% in the same time period. Potentially, surgeons using WebSMR (adopters) may have different characteristics and practices than nonadopters. However, the change in practice (breast conservation surgery vs TM) over time in the WebSMR users suggests that knowledge transfer may be causative rather than associative in this outcome.

Our observations would be strengthened if all surgeons entered their operative breast cancer reports using the Alberta WebSMR – the main limitation of this study. Through voluntary adoption thus far, the number of patients captured by the WebSMR rose from 450 patients in 2007 to 1,523 in 2011. This initially occurred based on education campaigns and surgeon leaders adopting the new system. Later, the driving factor for adoption was the ability of the individual surgeon to assess their own outcomes compared to their peers. All reports being captured may be possible in the future as the province is in the process of accepting individual surgeon to assess their own outcomes compared to their peers. All reports being captured may be possible in the future as the province is in the process of accepting.

In conclusion, breast conservation rates have increased among WebSMR patients from 2007 to 2011. The information transfer tool provided by the Alberta WebSMR is likely a significant factor in informing practice to conform to clinical practice guidelines. This methodology is an important mechanism to increase adoption of evidenced-based standards.

References


Discussion

Karen Kwong: The web-based synoptic operating reporting system (WebSMR) provides a powerful tool for tracking, providing Practice-Based Learning and supporting Evidence-Based Medical care with in-time data collection. This tool or requirement of information clarifying the
rationale for use of Total Mastectomy (TM) really ought to be incorporated into Cancer Registries, which would then help in complete data collection and hence, possible adherence (or at least increased knowledge) of current consensus on breast conservation therapy.

As the authors state, the tool may not be causal in the changes seen. It would be difficult to know if the huge increase in use from 450 patients in 2007 to 1523 patients in 2011 and 5% change in practice from TM to Breast Conservation Therapy (BCT) was due to change in knowledge from WebSMR or due to possibly increasing the pool of surgeons who favor BCT, particularly since it appears that the T stage was fairly similar, or for some other reason. As the authors note, it would be important data to know the information from those entered into the Cancer Registry who did not participate in WebSMR, since this accounted for almost 22% of breast cancers in 2011 and could make a big difference in Alberta’s descriptive rate of BCT vs TM use. The authors should be applauded in attaining such increase in usage of WebSMR. How did this occur? How will they plan on capturing all breast cancer surgeries in Alberta and in Canada or beyond?

In addition to the educational aspects and tracking of uses in therapies from provider to provider or amongst hospitals, the WebSMR may be very useful in identifying needs of certain populations or areas. While Canada has universal care, which may lessen the impact on choices as compared to the United States, it may help point towards geographic or economic issues of access. It may help as a needs assessment. For example, frontier or rural area patients may find Radiation therapy (RT) access or burden more difficult, even if insured if the treatment takes a patient far away from home/work for 6 weeks. Have you examined for differences by distances from RT centers to find if mattered or not? Is there a difference in Alberta’s rate of BCT use compared to other Provinces in Canada, as there are in the United States? Of the 1/3 who choose TM which are listed as patient preference, do we know what percent chose immediate breast reconstruction? This is the population where changes in practice could be made.

Does the WebSMR collect information on the surgeons and were there any differences in training or location? If so there a difference in those who use WebSMR vs those who do not? The WebSMR can be a very powerful tool, however, it may still not take away an individual bias and hence how they spin or emphasize information, such as recurrence differences vs long term data on survival equivalence and how people’s cancer fears are addressed. However, we have seen instances where in fact the tail can wag the dog, such as sudden success in finding the right number of nodes in colon cancer or the documentation of the total mesorectal excision when it was made a standard or quality measure. The success of the authors’ endeavors can truly make a significant contribution, and whether or not WebSMR is the cause for the changed rate in BCT, (as it could well be), it should be made an integral and mandatory part of breast cancer reporting.