Surgical Site Infection
Surveillance Program in a Home-care Setting

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This article reviews the implementation and results of a pilot of a surveillance model utilized by Home Care in the Calgary Health Region for patients post-acute-care discharge with surgical incisions. The pilot was based on a region-initiated prospective research study by Heidi Brandstadt, Pamela Armstrong and Elizabeth Henderson.[1] While the application of research study findings generally takes many years, this article demonstrates how one organization fast-tracked research results into a change in practice, resulting in improved patient outcomes.

Introduction

Health-care organizations are more frequently addressing the importance of transforming organizational culture in order to improve patient safety. Research in the area of surgical site infections (SSIs) has clearly shown that SSIs increase mortality, readmission rate, length of stay and costs for patients.[2,3]

Although there is a substantial body of literature on surgical site infection prevention and management, these infections continue to rank as the second most common type of adverse hospital event.[4] The cornerstone of a successful SSI prevention and control program is surveillance. SSI surveillance provides feedback to health professionals that supports evidence-based interventions to improve patient/client outcomes. However, most SSI surveillance is done in hospital settings, and the Brandstadt et al. paper[1] indicates that the majority of SSIs develop after discharge from hospital. This results in the reporting of inaccurate SSI rates and the potential for missing opportunities to reduce the impact and incidence of SSIs, particularly as the diagnosis of nosocomial SSI may be made within one year of implant surgery according to the Centers for Disease Control's (CDC) SSI definitions.

SSI research in the Calgary Health Region has initiated several immediate practice changes within Home Care. The model provided by the surveillance project has continued into a permanent program within Home Care, the main benefit of which is the early identification and treatment of SSIs. Home care professionals have an increased awareness of SSIs and related issues in home care, and communication between home care and hospitals has also increased. Surveys of home-care professionals showed that they were eager participants in the surveillance project as the necessary monitoring incurred only a small impact on workload. Continued post-surgical SSI surveillance is integral in improving home-care practice.

– Heidi Brandstadt

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Problem

In 2004, The Calgary Home Care's Skin and Wound Assessment and Treatment (SWAT) Team identified what appeared to be an increase in the number of clients with SSIs, which stimulated some discussion:

- Were these infections coming from one hospital site, one surgical theatre, or a specific surgical team? Or was the problem more global?
- Were the infections related to types of surgical interventions?

There were many questions but few answers. The unanswered questions, when presented to the Health Region's Infection Prevention and Control (IPC) department, led to the initiation of a prospective research study. Master's student Heidi Brandstadt took on the challenge of looking at the existing SSI surveillance program in the region, identifying the gaps in that structure and working with a team to develop an innovative approach to capturing post-discharge nosocomial SSI data.

The study results supported the implementation of an SSI surveillance program in home care in the Calgary Health Region (CHR). Home Care developed and tested a surveillance model, for cardiac and orthopaedic implant surgeries, and determined the efficacy of the current hospital surveillance program to determine total SSIs. This included the identification and reporting of nosocomial SSIs in the home-care setting.

Prior to this study, SSI surveillance and reporting were concentrated in hospitals under the direction of the IPC department. Only targeted (cardiac and orthopaedic) SSI surveillance was completed in the home-care project. The acute-care SSI data collection form and standardized definitions of SSI based on the National Nosocomial Infections Surveillance System (NNISS) of the CDC were used.

Aside from hospital readmissions, Home I.V. Therapy Program and emergency visits, reporting post-discharge SSIs was the responsibility of the attending physician or surgeon. Reporting was found to be inconsistent, and there was no policy related to reporting strategies. Nosocomial SSIs were identified only when the client was seen on or before the scheduled six-week post-operative appointment.

Home-care SSI Surveillance Model Pilot

A literature search found that most SSI surveillance occurred in hospital settings; only 10 published studies actually separated out SSI rates according to pre and post discharge.[3-12]

The sensitivity* of hospital surveillance was very low when post-discharge follow-up was not conducted. The newly formed Home Care Surgical Site Infection Committee, composed of Brandstadt, the IPC regional epidemiologist (the research lead), the regional IPC practitioner for home care, the clinical practice specialist for home care and two members of the SWAT Team developed a plan, and the Home Care SSI Surveillance Model Pilot was created. One objective of the model was to include home care in the identification and reporting of nosocomial SSIs and, therefore, perhaps, address the gap of surgical patients who developed an infection after discharge from an acute-care setting into home-care. The prospective research study developed and tested a post-discharge surveillance model in home-care clients who had cardiac or orthopaedic implant surgeries and determined the efficacy of the current CHR hospital surveillance program.[3]

Several planning meetings took place and a process map was developed to include home care as part of the SSI Surveillance Team.

Methods and Materials

A standardized methodology was created for post-surgical clients discharged to home care. Clients to be

Defining Surgical Site Infections

Surgical site infection is considered nosocomial within 30 days of procedure if no implant and up to one year post-implant surgery. Criteria include a combination of purulent discharge, organisms isolated, deliberately reopening incision, radiological evidence, classification or a physician diagnosis.
– Centers for Disease Control (CDC)

included in the study were identified by the transition home-care co-ordinators in hospital before discharge to the home setting.

The home-care cohort consisted of clients aged 18 years and over who resided in Calgary and were admitted to home care post-cardiac (coronary artery bypass graft [CABG] or valve replacement) or orthopaedic joint replacement (hip or knee) implant surgery between December 1, 2003, and June 30, 2004 (see Tables 1 and 2).

The surveillance program collected baseline data that linked with the existing hospital SSI surveillance program. An SSI kit, containing a data-collection worksheet based on the hospital model, was already in use. The worksheet was piloted for two months prior to the start of data collection and was revised with feedback. The final worksheet covered six aspects of the client experience:

1. client demographics (PHN, sex, age, etc.)
2. hospital and home-care admission, surgery discharge and re-admission dates
3. reported infection site
4. severity (based on CDC definition for SSIs in home care)
5. topical and systemic antimicrobial/antibiotic use
6. Bates-Jensen Wound Assessment Tool (BWAT)

Communication was a key factor to successful outcomes. Dissemination of the project and the roles and responsibilities of the 600 home-care staff involved was multifaceted; presentations, meetings with middle management, news articles, memorandums, e-mails and voice mails were initiated. The aim was to gain support and awareness of the role of the community-care co-ordinator (home-care nurse) related to the project.

The home-care co-ordinator followed the clients as per routine management. When signs of infection, as identified by the study parameters (as identified by CDC definitions [see sidebar on page 44]), were recognized, the SWAT Team RN completed a home visit to assess the client and the wound. A swab was taken and treatment was initiated using evidence-based wound-care interven-

TABLE 1

Efficacy of in-Hospital vs. Total Surveillance

- 1,542 cardiac and orthopaedic implant surgeries
  - 54 (3.5%) total SSIs
  - 27 (1.75%) SSIs captured first in-hospital
  - 27 (1.75%) SSIs captured first in home care
- Sensitivity*=50% (95% CI, 36.1%-63.9%)
- PV*=98.2% (95% CI, 97.4%-98.8%)
- Statistically significant difference between efficacy of in-hospital and total SSI surveillance
- SSI rate was undersestimated prior to post-discharge patient follow-up.

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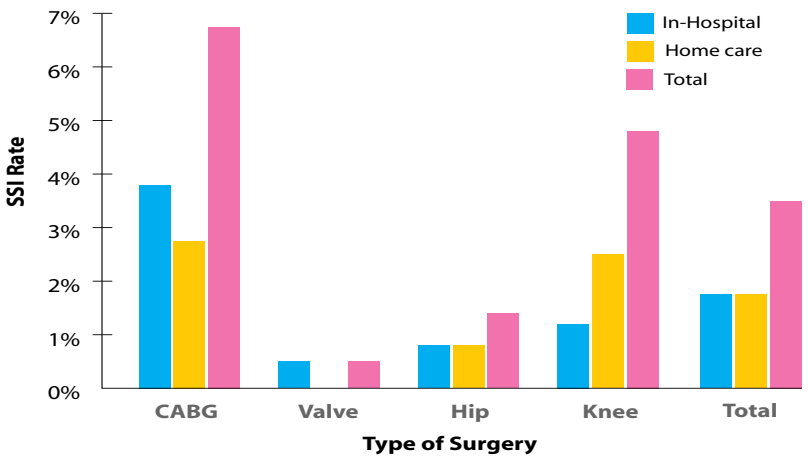
TABLE 2

Surgical Site Infection Rates



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* *"Sensitivity and Negative Prediction Value of In-hospital SSI Surveillance for Detecting Total SSI*

This study defined sensitivity as the probability of the in-hospital SSI surveillance system identifying a SSI, given its presence in the total SSI (see Table 2). The sensitivity of the in-hospital SSI surveillance system for detecting all SSI was 50.0% (95% CI, 36.1%-63.9%). There was a significant difference between the efficacy of the CHR in-hospital surgical site infection surveillance program and the new CHR surgical site infection surveillance program that included both in-hospital and home care data ($p<0.001$). The negative predictive value was defined as the probability of the total SSI surveillance program not detecting SSI, given that the in-hospital SSI surveillance system did not detect the SSI. The negative predictive value was 98.2% (95% CI, 97.4%-98.8%) for the in-hospital surveillance. Neither specificity nor positive predictive value could be calculated."

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tions. Most frequently a topical antimicrobial wound treatment was initiated—and systemic antibiotics, if not already part of the patient treatment plan, were also prescribed if deep compartment tissue involvement was suspected. There was a feedback loop to the attending physician as part of the process for data collection and collaboration.

Multiple sources were used for case-finding, including review of laboratory reports, rounds and chart reviews on patient-care units, review of emergency department visits and re-admissions, and patients with SSIs admitted to the Home Parenteral Therapy Program. All SSIs were entered into the SSI surveillance database and reported on a regular basis to the Regional IPC committee, the Department of Surgery and the individual surgeons.

Through the reporting and capturing of nosocomial infection data, the committee believed that the project could also achieve the following goals:

- reduce the impact of SSIs through early detection
- initiate timely, comprehensive reporting data
- support best practice wound management in the region

The SWAT Team was given an "Assess and Treat" physician order, allowing the team to initiate evidence-based, timely wound-care interventions based on the wound and client's needs versus standard discharge orders of normal saline and dry dressings.

Results

The home-care program was effective at detecting SSIs missed by the in-hospital surveillance, capturing 50 per cent of all SSIs identified during the study and identifying common surgical interventions that resulted in infection (see Tables 1 and 2). In some cases, clients' SSIs were identified early in their development, and treatment was managed in home care without additional costs to the region for items such as re-admission to hospital or I.V. therapy. *continued on page 48*

Participation in the Home Care SSI Surveillance Program had additional benefits:

- improved collaboration between acute-care hospitals and home care
- recognition that post-discharge wound infections are an important consideration
- increased early identification of SSIs
- increased awareness of surgical history when assessing wounds
- increased teaching opportunities
- improved observation of and responsiveness to signs of infection
- SSI surveillance easily integrated into everyday practice

Limitations of the study:

- clients were followed for only six months
- sample size
- combination of cardiac and orthopaedic surgeries
- home care LOS data incomplete
- survival analysis
- no data on non-home-care post-discharge patients
- reliability of home-care form not tested
- limited data on some variables
- comparisons limited at present

Discussion

The success of the project was directly linked to a surveillance system that utilizes home-care co-ordinators and the SWAT Team as a means of identifying and reporting nosocomial SSIs. By utilizing a team approach, the system minimized the use of limited health-care resources through early detection and timely interventions of evidence-based wound-care practices. Other successful strategies identified by the study included the development of a home-care worksheet and staff education that enhanced buy-in and supported accuracy and consistency of the documentation.

On a broader level, this project was a model of non-funded quality improvement activity that produced both inter-hospital comparative data and predictor data. The project was not limited to data collection. It supported multidirectional dialogue and collaborative communication between acute-care sites and home care, which in turn has opened discussions for expanding the home-care surveillance efforts to other types of infections, such as urinary tract infections. It also provided feedback to our regional administration, highlighting the problem and stimulating infection- and prevention-control activities. In addition, the work has opened discussions on reviewing existing surgical practices with a goal of working toward decreasing SSI incidence and prevalence with the potential to generate policy and procedure development from existing best practice guidelines.

The success of this work is now part of home care's routine practice known as the Home Care Surgical Site Infection Program. Ongoing education and reminders to the program staff and managers have been identified as a needed process to sustain awareness and ensure continued success.

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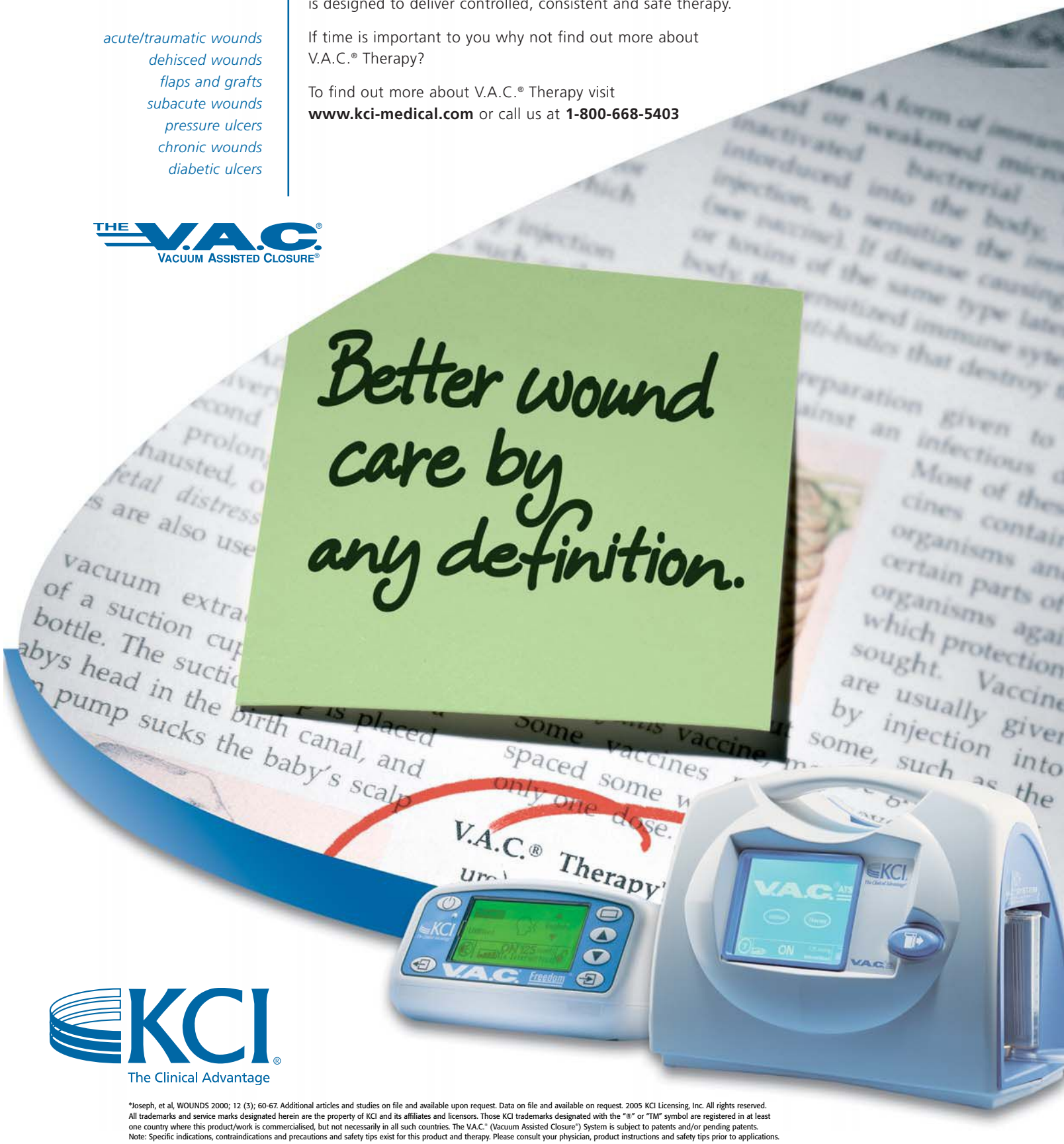

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