Guest editorial

Surveillance of surgical-site infections in orthopedics

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Health care departments are responsible for analyzing the quality of care they give. Such information is a concern to patients who seek care, and to hospitals, governments, those providing funds for health care, and to doctors in the departments themselves. A survey of wound infections is important because an infection may ruin the outcome of surgery, especially an arthroplasty. Although there is an increasing amount of easily accessible software available, the setting up of a reliable and informative register of infection is difficult and time-consuming. Such a register should produce accurate data that can be compared with the literature and other bench-mark data. A register makes sense only when used with a feedback to the surgeons: in that case the register in itself substantially reduces the rate of infection.

To set up an adequate register, one has to make several choices and avoid various pitfalls. First a decision should be made as to which operations should be recorded. The registration of clean operations provides the best information about the quality of overall health care, especially of prophylaxis against infection, but it needs many operations to be informative. Registration of operations with a high infection rate, such as "dirty" operations, gives more information about the surgical technic than about the effect of preventive measures. One choice is to register all types of operations. This could be done for a period of, e.g., 5 years to determine the risk of infection in different types of operations, and with the help of these data, it can be decided which operations should be registered in the future. Another choice is to register only hip and/or knee prostheses: this is a standardized and frequently performed operation all over the world.

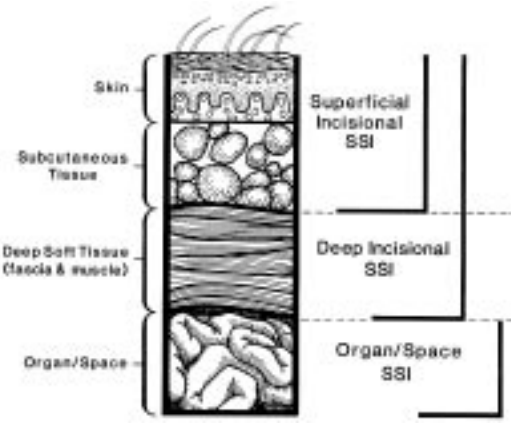
The infection rate is the result of a denominator (the number of operations) and a numerator (the number of infections associated with operations). The denominator data about the operations should be easily obtainable from the hospital administration: via the operation logs or the financial administration. Sometimes financial codes must be converted into operation codes. Most registers of operations also contain other data of interest for analysis—e.g., time and duration of the operation, acuteness of the operation, ASA classification, etcetera. If a patient undergoes more than one operation at the same session, only the wound of the main operation is recorded. Electronic download of the data directly into surveillance software limits errors in data entry and reduces a time-consuming part of the registration.

The collection of the numerator data is crucial, but also more problematic: how should one organize the identification and registration of the wound infections. In general, two methods are available for identification of wound infections: indirect and direct observations (Mangram et al. 1999, Wong 1999). With indirect observation, the infected cases are found by reviewing many kinds of data: microbiology reports, antibiotic prescriptions, temperature charts, nursery care reports, medical records, and interviews with primary care providers. With direct observation, the healing of the wound is assessed by a nurse in charge of infections, by a nurse trained as a surveyor, or by the surgeon. The sensitivity of the various surveillance methods, as reported in the literature, varies about 80–90%, and the specificity is near 100% (Mangram et al. 1999, Smyth and Emmerson 2000) .

The sensitivity of the registration can be improved by combining several indirect methods, but this may be time-consuming and so expensive. Glenister et al. (1993) compared 8 surveillance methods and found that the most effective method, a combination of several indirect methods, took 6.4 hours for 100 beds a week. The higher the costs of registration, the fewer hospital administrations and surgical departments are willing to support it.

The surveillance must take at least 30 days after the operation, and for implants, the follow-up should take 1 year: infections of implants that become manifest after 1 year are ascribed to a hematogenous cause and not to a per- or postoperative contamination. Because 12–84% of the wound infections are detected after discharge from the hospital, only inpatient surveillance will seriously underestimate the rate of wound infections (Smyth and Emmerson 2000, Boer et al. 2001, Stockley et al. 2001). Since hospital stays are becoming shorter, and operations in day-procedure units are increasing, the importance of surveillance after discharge increases. The postdischarge surveillance methods are the same as in-hospital surveillance. The assessment of wounds by patients themselves, and subsequent registration via mail or telephone seems to be inaccurate. Therefore, surveillance after discharge must include a direct surveillance in an out-patient service.

The definitions and classifications of surgical wound infections (SWI) should be uniform, and the most widely used ones are those of the Centers for Disease Control and Prevention (CDC), as defined in the National Nosocomial Infections Surveillance (NNIS) system. Recently, they redefined their original definitions of 1988 and renamed surgical wound infections as surgical site infections (SSI). They distinguish the following kinds of infections: superficial incisional (skin and subcutaneous tissue), deep incisional (fascia and muscles), and organ or space infections (all other body parts than the incised body wall layers). The last new category, however, is not yet used in orthopedic literature and may cause problems in future when results are compared. In orthopedics, this new category is suggested to include the infections of intervertebral discs, joints, bursa and bone (Mangram et al. 1999). Infections—e.g., in hip wounds below the fascia—should now be called



CDC classification of surgical site infections (Mangram et al. 1999).

"deep incisional" instead of "deep". This CDC definition seems to suggest that these deep postoperative infections do not automatically involve the joint or underlying bone.

The criteria of the CDC if a wound is infected, was the subject of an article by Sørensen et al. (1997), who did an 8-year survey of orthopedic operations. They confirmed that the diagnosis of infection in many cases is based only on the clinical judgment of the treating physician, as used in the criteria for wound infection of the CDC. In their patients, up to 30% of their recorded infections fulfilled just this subjective criterion. This illustrates a main problem in registering infections. In my opininon and that of others, in the early postoperative phase, it is clinically very difficult to distinguish between septic and aseptic healing. Because of this difficulty, it is essential for the recording that it should not be left to infection control nurses alone. This underlines the need for involvement of the surgeons themselves.

On pages 175-179 in this issue of Acta, Sørensen and co-authors report another important observation of their infection survey (Sørensen et al. 2003): they found a high rate of incorrect registrations and only 60% of the infections were recorded by the surgeons, the remaining 40% had to be found by retrospective control. When the surgeons were responsible for recording the infection, they had to fill in a special form, which did not seem to work well. The same problem, caused by the participation of doctors, has been described by

Poulsen and Meyer (1996) who found in another Danish survey that one-third of the surgeons had difficulty in getting basic data recorded, and half of them had problems with recording the infections. This may explain why so many wound surveillance programs are organized by infection control nurses, without involvement of the surgeons themselves. However, in my experience it is possible to incorporate the registration in the daily routine of all surgeons in the department. This largely reduces the time spent, and the responsibility for the recording is put where it belongs: on the surgeons themselves.

Sørensen et al. (2003) used a form to record infection for the most elementary data, which could be easily filled in at the operation, together with the classification of the wound. The same or a second form was used to record healing of the wound. If the form about an infection is always filled in, also in absence of an infection, then the number of forms for the operations (denominator) and the assessment of the wound (numerator) must be equal. This is a simple and reliable control of the completeness of the registration (registration rate). In our department, this varies between 90% and 70%. This rate seems to be largely associated with the degree of organization of the department as well as with the interest of the surgeons. Such interest can be increased by making regular reports. This feed back motivates the doctors and improves the quality of the registration. A surveillance with regular reports to the surgeons appears to be one of the best methods for reducing the postoperative infection rates (Wong 1999).

A recording of infections could be integrated into a registration of complications in the department. However, the specific information provided by an infection surveillance is also needed by other departments in the hospital—e.g., operating rooms, bacteriological departments. Such information is essential for decisions regarding prophylactic measures and the selection of antibiotics. Integration in a register of complications in a department may reduce the sensitivity and the registration rate to an unacceptably low level.

When a department of orthopedics wishes to start a wound surveillance, the organization of a separate and effective routine for the SSI data takes much effort, and this is even truer of keeping the registration rate high for many years. At least one of the staff members must take on the task of acting like a policeman, who checks the data, and repeatedly reminds his surgeon colleagues.

I recognize the problems described by Sørensen et al. (2003), but, hopefully, these will not discourage those who want to start a surveillance program. Doctors must try to record data that will help them to maintain a high standard. They may be helped by infection control specialists, as well by the hospital administration: but, in the end, it remains their personal responsibility.

No competing interests declared.

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