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Telephone call contact for post-discharge surveillance of surgical site infections. A pilot, methodological study☆

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Summary Accurate determination of superficial surgical-site infection (SSI) requires post-discharge surveillance (PDS) for up to 30 days. To be useful for regional or national audit the method must be effective, inexpensive, and acceptable to patients. We assessed the role of telephone calls to patients in PDS of SSI in 3150 patients in 32 Scottish hospitals undergoing groin hernia repair during one year. Overall, 104 (3.3%) patients opted out of the audit by declining to give a contact telephone number, 96 (3.0%) could not provide a personal telephone contact number, and 12 could not be contacted, a compliance rate of 93.3%. Two thousand, nine hundred and thirty-eight patients were contacted at one or all of the call points, i.e. 10, 20, or 30 days postoperatively, from a single call centre by medical records clerks, working to a piloted protocol. Contact data, including contact at all three time points are available on 2665 (84.6%) patients. All patients who believed their wound to be infected were seen by a healthcare worker (HCW) to confirm or refute the diagnosis. Of the 2665 patients in whom complete data are available, 140 (5.3%) patients developed confirmed wound infection and a further 57 (2.1%) thought their wound was infected, but this was not confirmed by the HCW. Patients appeared to welcome the concept of telephone contact. Methods for identifying all patients eligible for surveillance need to be improved. However, we believe this method of patient contact could be appropriate for PDS in regional or national audit.

Introduction

Infection remains a common complication after most forms of surgery. In 'clean' operations no

☆ This work was undertaken at the Western Infirmary, Glasgow and at hospitals throughout Scotland.

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bacterially colonized tract of the body is opened and any postoperative wound infection might be seen as a reflection of the environmental conditions in which the operation was performed, or as an indicator of surgical technique and expertise. The incidence of postoperative, 'clean' wound infection could, therefore, be advocated as an indicator of hospital performance and a possible form of assessment for clinical governance.

The incidence of surgical-site infection (SSI) recorded in the course of audit depends on the definition of SSI adopted, on the intensity of surveillance, and on the prevalence of risk factors for SSI in the patient group being audited. The Centers for Disease Control and Prevention (CDC) definitions of infection[1] have been developed and validated over the past 20 years and are the definitions most commonly used for diagnosis of SSI in audit and research worldwide. In addition other work has shown that most postoperative, superficial SSIs present within 30 days of operation,[2] and this has become the accepted period of surveillance for SSI after operations that do not involve prosthetic implantation. With the increasing trend towards day-care or short-stay hospitalization for many clean wound operations, surveillance of the patient in the community, post-discharge surveillance (PDS), is an important part of the audit of postoperative complications.[3] To determine the incidence of infection accurately, all patients undergoing the procedure must be surveyed for the same duration and using the same definition of infection.

There is no international consensus on the optimal method of PDS. Many approaches have been reported including patient review by a healthcare worker (HCW) at follow-up clinics or by questionnaire, contacting patients by questionnaire or by telephone. These methods are the subject of a systematic critical analysis by Bruce et al.[4] who report a range in the effectiveness of follow-up from 30% to over 90% (Table I). The comparative costs of these methods is not reported.

Diagnosis of the presence of an SSI is also problematical. Different definitions of infection have been applied and the validity of the diagnosis of wound infection during PDS is not often reported.[5] In some studies the diagnosis has been made by a HCW and in the others the diagnosis has been made by the patient. The ability of the patient to diagnose infection accurately has been shown, in a number of studies, to be poor.[6,7] However there is some evidence to suggest that the patient is much more accurate in determining when their wound is *not* infected.[5,6]

The most accurate method of diagnosing SSI after the patient has been discharged from hospital would be repeated, frequent review of patients by a trained HCW.[7,8] This approach is likely to be too labour intensive and expensive for a national audit after operations where a low incidence of SSI is anticipated.

Table I Methods of post-discharge surveillance (adapted from Bruce et al.[4])

Method	Range of response rates (%)
Direct observation of wounds by medical, nursing or infection control staff	67–85
Postal questionnaire to patients	30–79
HCWs/surgeon	50–79
Diary cards	54–65
Telephone contact with patients, GPs or other HCWs	38–92

HCW, healthcare worker; GPs, general practitioners.

Currently 93% of households have a land-line telephone and 73% of the adult population now own a mobile telephone (Annual Market Information 1996/7 to 2000/1. Dec 2001. www.oftel.gov.uk, Chapter 4). We have undertaken a study to assess the feasibility and effectiveness of telephone interviews to screen patients for the presence of SSI after discharge following a 'clean' procedure, a groin hernia repair. Groin hernias were considered suitable for this pilot methodological study as they are day-case or short-stay operations, and this work would be a follow-on to the Scottish Hernia Audit,[9] in which all complications after groin hernia repair had been audited by a group based in the Western Infirmary, Glasgow, and which had suggested the incidence of infection was 8%.

Method

Patients studied

Patients undergoing groin hernia repair in mainland Scottish hospitals between October 2000 and September 2001 were included in the audit. All surgeons involved gave permission for data on their patients to be utilized in this audit. In view of the fact that this was an audit of SSI, and no new form of treatment was being investigated, Ethics Committee approval was not considered necessary.

Data collection

The audit centre

A study co-ordinating centre was established at the Western Infirmary in Glasgow. Three staff based at the centre coordinated the study, being responsible for liaison with hospitals, for patient recruitment data entry, making telephone calls to patients, arranging for HCWs to inspect suspect wounds, collecting additional data from case notes, and entering all the study data on to the database. In addition, the project co-ordinator visited each participating hospital to collect data on risk factors for infection, duration of operation, etc.

Recruitment of patients

On admission to the hospital, local medical records staff were asked to give each patient undergoing groin hernia repair a written explanation of the study, an invitation to take part and a questionnaire to complete which would indicate their home, work and/or mobile telephone numbers. If a patient declined to take part, by not giving contact telephone numbers, this was documented. The completed questionnaires were transmitted electronically to the audit centre established at the Western Infirmary, Glasgow, and entered onto the study database.

Telephone calls to patients

The study database was programmed to alert centre staff to contact the patients at 10, 20 and 30 days after operation to ascertain whether they thought they had a wound infection and to ask about their symptoms. The questions asked at each telephone contact are given in Table II. The questions asked were intended to detect superficial SSIs only, not deep or organ/space infections.

All follow-up telephone calls were made by one of three members of staff, who had received training in the use of a standardized, piloted telephone questionnaire and were made at a time that the patient had previously indicated would be convenient. The audit centre staff worked flexibly to permit a wide range of call times.

Table II Questionnaire for telephone contacts

Do you think you have developed a wound infection?
How many days ago did you first notice any signs of infection?
Is the area around the wound red and inflamed?
Is the wound swollen or painful?
Do you have any fluid leaking from your wound?
If YES, is it: (a) clear? (b) pus/cloudy yellow? (c) pink, red or blood?
Is the wound gaping open?
Do you have a temperature?
Has anyone seen the wound, e.g. district nurse or GP? If YES, who?
Has a wound swab been taken?
Are you taking any antibiotics for a wound infection? If YES, give name(s)

Confirmation of the diagnosis of SSI by a HCW

Patients who reported a wound problem during a telephone interview were referred to a HCW who assessed whether the wound was infected and instituted treatment if necessary. It was logistically difficult to arrange training in SSI diagnosis against the definition for all HCWs in this national study, but the definition was sent to the HCW every time an assessment was requested and staff were asked to make the assessment against this diagnosis. Arrangements were made for the patient to be seen as soon as possible, either in primary care or at the hospital where the operation was performed. A 'Details of Infection' form was faxed to the HCW who was to see the patient for completion. Diagnosis of infection was made according to the CDC definition of superficial SSI[1] and a copy of this definition was included with the 'Details of Infection' form for use by the HCW making the diagnosis. The HCW was asked to complete the form and to take a microbiological wound culture swab if this was appropriate. The completed form was transmitted back to the audit centre for entry onto the study database.

Costing of telephone calls

The duration of all calls where this was recorded was summed and this was costed at British Telecom's call per minute rate at peak time (£0.08/min). Faxes were costed at £0.08 each.

Results

The audit was conducted from 1 October 2000 to 30 September 2001. Details of 3150 patients were received by the audit centre, of whom 104 (3.3%) declined to give contact details. Twenty-five (24%) of these patients were in one hospital. Overall, 2938 patients were contacted by telephone at one or more of the contact time points during the study, giving a response rate of 93.3%. Complete follow-up data, with contact at 10, 20 and 30 days, as well as the data required from the operation notes, were available on 2665 patients. The remaining 381 were excluded because the patient was not contactable by telephone on one or more of the three contact dates ($N = 116$); only the general practitioner's (GP) contact telephone number was given ($N = 96$),

the HCW record was missing ($N = 6$); and required data from operation notes were missing ($N = 163$) (Figure 1).

Up to four attempts were made to contact each patient at each time point. A total of 104 patients could not be contacted at one or more of the three call points. In addition, 12 patients were not contacted at any point. The number of calls made was 11 502, with a median of one call to each patient at each time point. Three quarters of all calls (8787/11502) resulted in successful data collection. The duration of the call was recorded for 83% of these calls, which averaged about 1 min (range 1–23 min). Calls were made between 05.58 and 21.15 h, with the majority (91%) being made during 'peak time' (08.00 to 18.00).

SSI

Of the 2665 patients for whom complete data are available, 197 (7.4%) reported that they thought they had a wound infection. SSI was confirmed by the HCW in 140 (71%) of these patients; 59 (42%) presented between 0 and 10 days, 55 (39%) between 11 and 20 days, and 26 (19%) between 21 and 30 days. The overall confirmed incidence of infection was 5.3%. Further details of the results from this audit and the influence of the risk factors for infection will be published elsewhere.

The majority (80%) of patients who suspected that they had a SSI were seen in general practice by a GP or by a nurse, and an infection was confirmed in 77% (121/158). Surgical ward staff confirmed the presence of a SSI in 47% (14/30) of patients seen by them. Other hospital-based HCWs, including accident and emergency doctors and nurses, and an audit nurse, reviewed the remainder of patients, diagnosing infection in 67% (5/9).

Costs

The audit was funded by the Clinical Research and Audit Group (CRAG) of the Scottish Executive. The costs additional to routine clinical practice were as follows: computer programming and data analysis £10 000; telephone calls/faxes £959; project co-ordinator and medical records staff salaries £62 942; travel expenses £6327; supplies £2960; total £83 188. No charge was made for the facilities used in which to conduct the audit.

The cost of a hospital consultant outpatient consultation is currently £63, and £19 for a GP consultation (NHS Executive 'The New NHS—Reference Costs 2001'. www.doh.gov.uk/nhsexec/refcosts.htm). Thirty patients were seen for review in hospital, at a cost of up to £1890, and the other 167 patients seen in primary care at a cost of up to £3173. Therefore the total cost for this audit is £88 251, which is £28.97 for each of the 3146 patients participating.

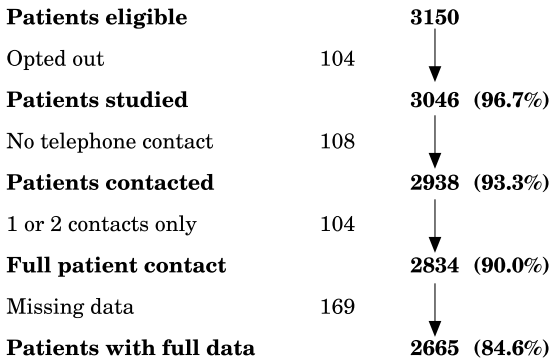

Figure 1 Study profile.

Discussion

In an era of clinical governance, it is increasingly important that surgeons and hospital management are aware of the incidence of healthcare-associated infection and other complications of hospital care, and are thus able to take steps to minimize these complications. However, with the diminishing duration of postoperative inpatient stay and the increasing trend towards day-care or short-stay surgery, the incidence of infection after operation becomes difficult to determine. There is, as yet, no agreement on the optimal method of PDS. In an article in 1999 entitled 'Guidelines for the prevention of surgical site infection' Mangram et al. state 'At this time, no consensus exists on which post-discharge surveillance methods are the most sensitive, specific, and practical'.[10] Monitoring for SSI after the patient has left hospital presents two challenges, first to follow-up all eligible patients, and second to diagnose wound infection accurately in these patients.

In view of the wide availability of telephone communications in the UK, we believed this method of contacting patients to screen for the presence of SSI should be reassessed. The study has demonstrated that this method of contact is both feasible and effective. Only 3.3% of patients declined to give a contact telephone number, and one quarter of these were in one hospital, which may reflect the approach or enthusiasm of the staff member making the request at that hospital. Ninety-three percent of those who agreed to take part could be contacted by telephone. This compares very favourably with other methods of PDS (Table I).[4]

Most patients were happy to be contacted about the state of their wound, and the average duration of a successful call was very short at 1 min. The increasing prevalence and availability of mobile telephones makes contacting patients much easier, particularly in those age groups and in those areas of the country where there is a high level of workforce mobility. If this method were to be used in areas of the country where English is not the first language of a proportion of the population appropriate arrangements would need to be considered.

Weigelt et al.[2] have demonstrated that 96% of all superficial wound infections are evident by the 28th postoperative day and 30 days has become the accepted duration of follow-up for SSIs where there is no prosthetic implant. We attempted to contact all patients at 10, 20 and 30 days postoperatively, as it was not clear when in this period the infection usually presents and whether all three contacts are necessary. We found that patients presented with confirmed infection throughout the 30-day surveillance period. A single call at 30 days would not be a satisfactory method of audit, as diagnosis will depend on the patient's recall of the presence of signs and symptoms of infection. Further, if only a single call were to be made at 30 days, the presence of infection could not always be confirmed by a HCW.

The method we have studied is suitable for the diagnosis of superficial wound infection but we found that only 140 (71.2%) of the 197 patients reporting problems were correctly diagnosed as infection by the patient. This figure is consistent with the results of other studies.[5,6] Deep SSIs and infections associated with implants usually result in contact with a HCW and/or readmission to hospital. Other methods of ascertainment, for example through linkage of inpatient records, may need to be used in the surveillance of these more severe postoperative infections.

Previous studies have demonstrated that patients accurately diagnose the absence of a wound complication,[5,6] but are less accurate in diagnosing the presence of infection. Screening for wound infection through telephone calls to patients identified the small proportion (197 or 7% of 2665) who needed to be seen by a HCW to confirm or refute the patient's diagnosis of SSI. The HCW was provided with a copy of the CDC definitions of superficial SSI each time a patient was referred for examination of a suspect wound and was asked to report whether a wound infection was present according to that definition. The majority of patients had their wounds assessed in primary care. However a large number of different HCWs were involved in diagnosis, and there was a marked difference in the proportion of infections confirmed in hospital and in general practice. It was not possible to validate the accuracy of the diagnoses that were made by these HCWs. In any future study it would be essential to ensure that all HCWs undertaking diagnosis of SSI are trained in diagnosing infection according to the CDC definition, and for quality checks to be undertaken to ensure that wound infections are being accurately diagnosed.

We were unable to ensure that all patients undergoing groin hernia repair were invited to participate in this study and, from the previous Scottish Hernia Audit,[9] we are aware that the total number of patients undergoing groin hernia repair in Scottish hospitals each year is in the region of 5500. Therefore we estimate that this audit is based on 55–60% of the total eligible population, but have no reason to believe that failure to invite patients to participate in this prospective audit was other than on a random basis.

It was not possible to establish an efficient or consistent method of identification of all eligible patients and we had to rely on a variety of local arrangements. This approach relied on the good will of various members of staff and on their availability and memory rather than on established procedures. If national audit is to be undertaken by this method in the future, efficient recruitment of patients can only take place if data are available that enable the identification of the eligible patient group, and robust organization ensures recruitment of all eligible patients. Obtaining telephone contact details needs to be done in accordance with guidance on the confidentiality of patient information.

We believe this method of audit of SSI is feasible and financially viable. This audit has cost less than £30 per head, whereas to have patients reviewed in primary care or in hospital at the same intervals would have been greatly more expensive and, we believe, less acceptable to the patient. We have used a telephone call centre concept with clerical staff contacting the patients, working to a piloted protocol and have only reviewed, physically, those patients where there appeared to be a wound complication. A dedicated call centre has a number of benefits, which include standardizing the content and tone of the telephone contact. It also permits flexible, out-of-hours working, which improves the likelihood of successful contact with the patient.

Collection of appropriate data for audit should become part of the admission routine of the patient. Linkage and integration of operating theatre data to hospital admission and discharge data, and to laboratory data is essential before

meaningful audit can be conducted on a national basis using standardized data collection sets. Previous studies have indicated a wide variation in the effectiveness of telephone call contact to identify possible postoperative infection. This study has demonstrated that using a dedicated call centre in an era of wide telephone availability, contact can be made with a high proportion of patients by this method and is acceptable to the majority of patients. It has permitted the identification of the small proportion of patients who need to be seen by a HCW to document the presence of infection. We would commend this method of patient contact for audit as a model for the future, indeed the call centre concept could be broadened to include audit of other medical and surgical outcomes.

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