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Evaluation of surveillance for surgical site infections in Thika Hospital, Kenya

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SUMMARY

Background: In low-income countries, surgical site infections (SSIs) are a very frequent form of hospital-acquired infection. Surveillance is an important method for controlling SSI but it is unclear how this can best be performed in low-income settings.
Aim: To examine the epidemiological characteristics of various components of an SSI surveillance programme in a single Kenyan hospital.
Methods: The study assessed the inter-observer consistency of the surgical wound class (SWC) and American Society of Anesthesiologists (ASA) scores using the kappa statistic. Post-discharge telephone calls were evaluated against an outpatient clinician review 'gold standard'. The predictive value of components of the Centers for Disease Control and Prevention – National Healthcare Safety Network (CDC-NHNS) risk index was examined in patients having major obstetric or gynaecological surgery (O&G) between August 2010 and February 2011.
Findings: After appropriate training, surgeons and anaesthetists were found to be consistent in their use of the SWC and ASA scores respectively. Telephone calls were found to have a sensitivity of 70% [95% confidence interval (CI): 47–87] and a specificity of 100% (95% CI: 95–100) for detection of post-discharge SSI in this setting. In 954 patients undergoing major O&G operations, the SWC score was the only parameter in the CDC-NHNS risk index model associated with the risk of SSI (odds ratio: 4.00; 95% CI: 1.21–13.2; $P = 0.02$).
Conclusions: Surveillance for SSI can be conducted in a low-income hospital setting, although dedicated staff, intensive training and local modifications to surveillance methods are necessary. Surveillance for post-discharge SSI using telephone calls is imperfect but provides a practical alternative to clinic-based diagnosis. The SWC score was the only predictor of SSI risk in O&G surgery in this context.

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Introduction

A World Health Organization (WHO) systematic review in 2011 on hospital-acquired infections (HAIs) highlighted the scarcity of studies from low-income countries and from African countries in particular.[1] From limited information, surgical site infections (SSIs) were identified as a significant problem: the risk in developing countries was 'strikingly higher than in equivalent surgical procedures in high income countries'.

Conducting surveillance for SSIs is recognized as making an important contribution to reducing the risk of these infections. Establishing high-quality surveillance with timely feedback to surgeons can lead to reduction in risk of SSI.[2] A systematic review of interventions for preventing SSI in sub-Saharan Africa found no examples of surveillance being conducted with the primary purpose of reducing the risk of SSI.[3]

The SENIC project (Study on the Efficacy of Nosocomial Infection Control) had demonstrated that the critical components of SSI surveillance were: (i) accurate collection and reporting of information; (ii) appropriate stratification of risk.[4] For the first component, methods for accurate collection of information for SSI surveillance have been extensively researched in high-income countries.[5,6] However, these methods are not applicable in hospitals in low-income settings where data extraction from inpatient records is challenging and electronic linkage to primary healthcare records is impossible. In all settings, many SSI cases occur after discharge from hospital.[6] Incorporating these cases into surveillance systems is especially problematic in low-income settings, where surgical patients are often dispersed over a wide area.

For the second component of SSI surveillance, an appropriate system of risk stratification is needed to make comparisons of the risk of SSI between centres or over time. The Centers for Disease Control and Prevention – National Healthcare Safety Network (CDC-NHSN) risk index provides one such system. A score of 0–3 is assigned based on the sum of values derived from the American Society of Anesthesiologists physical status classification (ASA) score, the surgical wound class (SWC) and operation duration in relation to a procedure-specific length (time *T*).[7] Although these components of the risk index are, in principle, readily transferable to low-income settings, an important question is whether accuracy of scoring in routine clinical practice in such settings is adequate to reliably predict risk of SSI.

The aim was to evaluate epidemiological characteristics of various components of SSI surveillance in a low-income hospital setting in sub-Saharan Africa. We evaluated: the inter-observer consistency of SWC and ASA scoring; the sensitivity and specificity of telephone calls for identifying SSI against a clinician review 'gold standard'; the association of CDC-NHSN risk index components with the risk of SSI in this setting.

Methods

Thika Level 5 Hospital is a 300-bed government hospital in the town of Thika, about 50 km north east of Nairobi, in Central Province of Kenya. At Thika Hospital there are six consultant surgeons and a rotating pool of 16–20 medical officers (junior doctors) and clinical officers (vocationally trained clinicians) who carry out a range of elective and emergency surgical procedures. There are four operating theatres and about 300 major and minor operations take place monthly. Caesarean sections are the most commonly performed procedure. Surgical instruments are reprocessed in a steam autoclave with monitoring by a change in colour of sealant tape. Prior to February 2011, antibiotic prophylaxis was normally administered to patients postoperatively, as is standard practice in many government hospitals in the region. Thika Hospital is not a university hospital, nor does it have an extensive history of research collaborations. It is a typical mid-sized Kenyan government hospital.

As a collaborative project between the Ministry of Medical Services, the Kenya Medical Research Institute and Thika Hospital, SSI surveillance was conducted at Thika Hospital for a continuous period from August 2010 to December 2011.

All patients gave written consent to participation in surveillance, which included contact by phone after discharge from hospital. This study was approved by the KEMRI National Ethical Review Committee.

Postoperative patient reviews, data and sample collection, phone calls and data entry were performed daily by a team of hospital staff members (two clinical officers and four support staff). All data for CDC-NHNS risk index criteria were recorded by hospital surgeons and anaesthetists. We diagnosed SSI in accordance with CDC-NHSN definitions as far as possible given the diagnostic facilities available.[8] Microbiological criteria were not used for SSI diagnosis, although microbiology services at Thika Hospital were upgraded as part of the surveillance. All diagnoses of SSI were discussed with the relevant surgical team and an infectious diseases physician. Feedback of ongoing surveillance results was given in writing and discussed in a series of multidisciplinary seminars.

In our surveillance, we included all surgical operations where a surgical wound was created during the procedure and the patient stayed overnight in hospital. We therefore excluded patients having day-case surgery (including all ear/nose/throat, ophthalmic and minor gynaecological procedures) and debridement of traumatic or infected wounds. During their inpatient stay, postoperative patients were reviewed at every dressing change, normally starting on the third postoperative day and on alternate days thereafter. Patients remained in SSI surveillance for 30 days after all eligible surgical operations, including both inpatient and outpatient periods. Postoperative readmissions to Thika Hospital were actively sought daily. After discharge, telephone-based surveillance was conducted as described below. Patients were encouraged to contact the surveillance team if they received treatment for wound complications at another facility.

All information for SSI surveillance was recorded in a custom-made PHP-MySQL database. Statistical analyses were performed using Stata v12 software (Stata Corp., College Station, TX, USA).

Consistency of SWC and ASA scores

Scoring consistency tests were conducted with the Surgery, Obstetrics and Gynaecology (O&G) and Anaesthetics departments in Thika Hospital. In each department, a series of 10 case histories was developed describing patient scenarios similar to those encountered in local practice. After revision of the relevant scoring system, all departmental members independently scored the SWC or ASA for these case histories. These results were presented to each department and the need to