

The incidence of percutaneous gastrostomy infection and variation in wound care practices

Davis JP • Entrop M • Read SJ

Abstract

The aim of this study was to assess the incidence of percutaneous gastrostomy site infections and to describe current wound care practices in response to this problem at our hospital. A retrospective audit of medical records and hospital databases was performed. Patient demographics, indication for gastrostomy, insertion technique, prophylactic antibiotic use, pathology results and wound care practices, including the use of cleansing agents, topical antiseptics and dressings, were recorded. Compliance with the hospital protocol for gastrostomy wound care was determined. Gastrostomy site infection was determined by reviewing clinical assessments recorded in the medical record.

Gastrostomy site infection was found in 19 (32%) of 60 patients. The infection rate was not associated with demographics, indication for gastrostomy, insertion technique or antibiotic prophylaxis. Wound care documentation was poor, with 61% of non-infected wounds and 21% of infected wounds not documented. Variation in practice was high, with three types of cleansing agent, three types of topical antiseptic, six types of dressing and dressing frequency ranging from daily to every 2 hours. Documented practices tended to be inconsistent with hospital protocol. Gastrostomy site infection occurred in almost one third of cases. Wound care practices appear to be a significant contributor to this infection rate. The diversity and variability in wound care practices, combined with non-adherence to hospital protocol, supports this view. Given the paucity of research evidence to support current wound care strategies, further research is needed in the form of randomised controlled trials.

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James P Davis*

BComm BNurs(Hons) RN
Research Coordinator

Monique Entrop

BNurs RN
Clinical Nurse

Stephen J Read

MBBS PhD FRACP
Stroke Unit Coordinator

Stroke Unit, Department of Neurology
Level 7, Ned Hanlon Building
Royal Brisbane Hospital
PO Herston, Brisbane, QLD 4029
Tel: (07) 3636 2494
Fax: (07) 3636 7675
E-mail: James_Davis@health.qld.gov.au

*Correspondence to James P Davis

Introduction

Nosocomial stomal infection is one of the most common complications of percutaneous gastrostomy insertion, with estimates of incidence varying from 5-83% of patients¹⁻⁵. Previous studies suggest the three main determinants of local wound site infections are the insertion technique⁴, the use of antibiotic prophylaxis^{1, 2, 4}, and wound care practices^{1, 2, 4}.

Strategies to prevent infection have tended to focus on improved insertion techniques and the use of antibiotic prophylaxis. Gastrostomy insertion techniques have improved significantly over the past 2 decades, with recent studies finding no significant difference in complication rates, irrespective of whether the gastrostomy was placed by endoscopic, radiologic or surgical techniques⁶⁻¹¹. Similarly, early observational studies of antibiotic prophylaxis reported no significant difference between patients receiving or not receiving prophylactic antibiotics^{1, 2}. However, more recent randomised controlled trials have shown that antibiotic prophylaxis significantly reduces the risk of infection¹²⁻¹⁶.

In contrast, wound care practices have been inadequately researched, with only one study reported in the literature¹⁷. This study was a case report that explored the effectiveness of charcoal impregnated with silver in the management of wound colonisation and infection. In the absence of research that specifically addresses the problem of gastrostomy site infection, clinicians can only seek guidance from generalised wound care and infection control principles. An example of these principles may be found in Kingsley's model of *The Infection Continuum*¹⁸⁻²⁰. Whilst these principles suggest the conditions for using wound cleansing techniques or topical antiseptics^{21, 22}, they do not appear to be effectively applied in specific contexts such as the care of gastrostomy site wounds.

The present study was conducted in an effort to identify the current gastrostomy wound care practices in our hospital. The aim of this study was to assess the incidence of gastrostomy site infections in hospitalised patients, and to describe the variability of current wound care practices in response to this problem.

Methods

Participants

All patients who had a gastrostomy inserted at our hospital during the 12 months from 1 May 2001 to 30 April 2002 were included in this study.

Hospital protocol: wound care & documentation

The hospital protocol for gastrostomy care stated that the wound should be cleansed on a daily basis with soap and water and that no dressing should be applied. The application of topical antiseptics was not mentioned in the protocol. The protocol recommended that, when signs of infection were observed, the patient should be treated with antibiotics and the site should be dressed regularly; however, there were no specific recommendations for the use of different cleansing agents, topical antiseptics, types of dressings, the frequency of wound care or the route of antibiotic administration.

The hospital protocol fosters a practice of documentation by exception, such that we anticipated that documentation of wound care would be more complete for infected wounds than for non-infected wounds. While non-documentation might imply the patient received standard care as outlined in the gastrostomy care protocol, this cannot be assumed. Therefore, we recorded the proportion of patients in whom the various wound care strategies were documented, and compared the rate of documented use between infected and non-infected wounds.

Data collection

Data were collected by a retrospective audit of medical records and hospital databases. The incidence of infection was determined by reviewing clinical assessments recorded in the medical record, and pathology test results from the hospital pathology database. Gastrostomy sites were considered infected where signs of inflammation such as pain, tenderness, swelling, or the presence of purulent discharge were recorded. Pathology test results were reviewed for all patients to identify cases of a positive culture. Where a positive culture was present in the absence of clinical signs of infection, the wound was classified as colonised rather than infected.

Data extracted from the medical records included demographic data, the reason for gastrostomy insertion, the insertion technique, the use of antibiotic prophylaxis, and wound care practices for the gastrostomy site. Details of wound care related to cleansing agents, topical antiseptics, dressings, and the frequency of dressing were recorded. In addition, compliance with the hospital protocol for wound care was recorded.

Data analysis

This study analysed both qualitative and quantitative data to determine the incidence of infection, and to describe the current state of wound care practices. Quantitative data were analysed using univariate, descriptive statistics. Fisher's exact test was used to determine statistical significance for categorical data and an unpaired t-test was used for continuous data. Significance was defined as a p value <0.05. Rigorous statistical analysis of data was not possible due to the small sample size and the variability in wound care practices that further reduced the size of data groups.

Results

Sixty patients underwent gastrostomy insertion during the study period and were included in the analysis. Of the total sample, 19 (32%) had clinical signs of infection; 10 (17%) with clinical signs were confirmed by positive culture. Three (5%) had wound colonisation without signs of infection. There were no differences in infection rate when analysed by patient age, gender, the reason for gastrostomy insertion, the insertion technique, or whether antibiotics were received prior to gastrostomy insertion (Table 1). Fifty-one (85%) patients received some antibiotic immediately prior to gastrostomy insertion, although the antibiotics used varied widely.

Microorganisms cultured from swabs of infected gastrostomy sites included *Staphylococcus aureus* (nine cases, four with Multi-Resistant *S. aureus* – MRSA), *Pseudomonas aeruginosa*

(five), *Candida* species (three), *Corynebacterium* species (two) and *Acinetobacter calcoaceticus* (one). Swabs from the three colonised gastrostomy sites were found to have *S. aureus* (three) and *P. aeruginosa* (one).

In 29 (48%) cases, wound care was not documented (Table 2). No documentation of wound care was observed in 25 of 41 (61%) non-infected wounds and four of 19 (21%) infected wounds ($p=0.005$). Where documented, wound care practices varied widely (see summary in Table 2), with three types of cleansing agent, three types of topical antiseptic, six types of dressings, and frequency of care ranging from daily to every 2 hours. The relatively small number of episodes of documented wound care, combined with the diversity of practices found, prevented further meaningful statistical analysis.

Of the cases with documented wound care, one non-infected wound was cleansed with soap and water, in accordance with the hospital protocol, compared with four infected

wounds. Similarly, for wound care frequency, two non-infected wounds and five infected wounds were dressed on a daily basis, as required by hospital protocol. As there was no specific guidance in the hospital protocol for the care of infected wounds, protocol non-compliance in relation to the use of topical antiseptics or dressing types cannot be determined. However, of the non-infected wounds, eight received a topical antiseptic and five received some form of dressing. In contrast, the hospital protocol recommendations did not mention the use of topical antiseptics, and advised against the use of dressings.

Discussion

This study found a high rate of infection for gastrostomy wounds that was not related to factors such as patient age, gender, the indication for a gastrostomy, the insertion technique, or the use of antibiotic prophylaxis. An initial concern was that antibiotic usage may have been inappropriate for the types of flora found

Table 1. Patient characteristics.

| | N | Non-infected | Infected | p value* |
|-------------------------------|----|--------------|-------------|-------------------|
| Age | | | | |
| Mean (\pm SD) | 60 | 67 \pm 20 | 63 \pm 26 | 1.0 |
| Gender | | | | |
| Male n (%) | 36 | 28 (78) | 8 (22) | |
| Female n (%) | 24 | 13 (54) | 11 (46) | 0.09 |
| Reason for PEG | | | | |
| Stroke n (%) | 24 | 16 (67) | 8 (33) | – |
| Cancer n (%) | 16 | 11 (69) | 5 (31) | 1.0 [†] |
| Trauma n (%) | 10 | 7 (70) | 3 (30) | 1.0 [†] |
| Other Neurological n (%) | 10 | 7 (70) | 3 (30) | 1.0 [†] |
| Antibiotic prophylaxis | | | | |
| Any Antibiotic n (%) | 51 | 35 (69) | 16 (31) | – |
| Nil Antibiotic n (%) | 9 | 6 (67) | 3 (33) | 1.0 |
| Aminoglycoside n (%) | 40 | 28 (70) | 12 (30) | – |
| Penicillin n (%) | 6 | 4 (67) | 2 (33) | – |
| Cephalosporin n (%) | 4 | 3 (75) | 1 (25) | – |
| Metronidazole n (%) | 1 | 0 (0) | 1 (100) | – |
| Insertion technique | | | | |
| Endoscopic n (%) | 53 | 38 (72) | 15 (28) | – |
| Surgical n (%) | 4 | 3 (75) | 1 (25) | – |
| Radiological n (%) | 3 | 0 (0) | 3 (100) | 0.19 [#] |

* p-values calculated using Fisher's exact test

[†] Comparison between stroke and other reasons for PEG insertion.

[#] Comparison between endoscopic and surgical or radiological techniques.

on swabbed wounds. Aminoglycosides appeared to be the predominant prophylaxis and this appeared to cover most of the microorganisms found²³. Despite the appropriateness of this prophylaxis, the use of antibiotics appeared to have no effect on the infection rate. This may indicate that the antibiotics provided coverage for the gastrostomy insertion procedure, with the source of infection being due to post-procedural variables.

The most significant factor that appeared in the data was the diversity and variability of wound care practices. This variation in clinical practice is indicative of a lack of consensus

on the best approaches to gastrostomy wound care, and reflects a paucity of research evidence to guide gastrostomy wound care practices.

Only one study has been reported on specific wound care practices for gastrostomy sites¹⁷. This was a case report that described a wound that had become infected due to over granulation and excessive exudate on the peristomal skin. The management plan consisted of a daily activated charcoal dressing impregnated with silver. The charcoal dressing was sufficient to absorb the exudate and the slow release of silver onto the wound provided an adequate topical antiseptic. The

Table 2. Variation in cleansing agents, topical antiseptics, dressings and frequency of care.

| | Total n (%) n=60 | Not infected n (%) n=41 | Infected n (%) n=19 |
|---------------------------------|---------------------|----------------------------|------------------------|
| Wound care documentation | | | |
| Any documentation | 31 (52) | 16 (39) | 15 (79) |
| No documentation | 29 (48) | 25 (61) | 4 (21)* |
| Cleansing agent | | | |
| Soap & water | 5 (8) | 1 (2) [†] | 4 (21) [†] |
| Normal saline | 14 (23) | 6 (15) | 8 (42) |
| Chlorhexidine | 2 (3) | 2 (5) | 0 (0) |
| Not documented | 39 (65) | 32 (78) | 7 (37) |
| Topical antiseptic | | | |
| Iodine | 11 (18) | 5 (12) | 6 (32) |
| Silver | 2 (3) | 2 (5) | 0 (0) |
| Mupirocin calcium | 1 (2) | 1 (2) | 0 (0) |
| Not documented | 46 (77) | 33 (81) | 13 (68) |
| Dressings | | | |
| Fibre gauze &/or surgical tape | 5 (8) | 4 (10) | 1 (5) |
| Non-permeable film/tape | 1 (2) | 0 (0) | 1 (5) |
| Semi-permeable film | 2 (3) | 0 (0) | 2 (11) |
| Calcium alginate & fibre gauze | 1 (2) | 1 (2) | 0 (0) |
| Hydrocolloids | 1 (2) | 0 (0) | 1 (5) |
| Combine & surgical tape | 1 (2) | 0 (0) | 1 (5) |
| Not documented | 49 (81) | 36 (88) | 13 (69) |
| Frequency | | | |
| Daily | 7 (11) | 2 (5) [†] | 5 (26) [†] |
| Twice daily | 3 (5) | 1 (2) | 2 (11) |
| Every 8 hours | 1 (2) | 1 (2) | 0 (0) |
| Every 4 hours | 1 (2) | 0 (0) | 1 (5) |
| Every 2 hours | 1 (2) | 1 (2) | 0 (0) |
| Not documented | 47 (78) | 36 (89) | 11 (58) |

* Difference between infected and non-infected wounds $p = 0.005$ (Fisher's exact test)

† Consistent with hospital wound care protocol.

continued on page 80

frequency of dressing was reduced as the level of exudate decreased. It was reported that the wound showed signs of significant improvement within 4 weeks.

This case study was documented in a similar environment as the current study, where an unacceptable rate of gastrostomy site infection was found within the hospital. Further, there was significant variability in wound care practices and no hospital protocol for gastrostomy wound care.

The current practices identified in this study involve various combinations of cleansing agents, topical antiseptics, and dressings, and variable dressing frequencies. In the broader wound care literature, cleansing agents have been reported as being used to remove excessive exudate and foreign material¹⁸. The use of antiseptic solutions as cleansing agents is considered to have little benefit compared with water, as the solution is generally not on the wound for a sufficient time to provide any significant benefit¹⁸. For this reason, tap water is considered to be an adequate cleansing agent in most circumstances. Our hospital protocol recommended that gastrostomy sites should be washed with soap and water on a daily basis. There were no recommendations in relation to infected gastrostomy wounds. We identified the use of soap and water, normal saline or chlorhexidine, with no significant difference in the frequency of their use between infected or non-infected wounds.

Almost a quarter of patients in our study received a topical antiseptic. Both iodine and silver are considered effective topical antiseptics, with iodine more frequently used in our study, presumably due to its greater availability. Silver is considered particularly useful in exuding wounds, although clinical evidence of its effectiveness is quite limited^{17, 18}. It has been suggested that these antiseptics are particularly useful when applied on a controlled release basis^{17, 18, 24}.

Opposition to the routine use of antiseptics is commonly found in the literature, primarily on the grounds that they promote resistance by microorganisms²⁵. Although the routine use of topical antiseptics is debatable²⁵, the case for their use in gastrostomy site wound care has been proposed due to the poor host defences of gastrostomy recipients and their susceptibility to infection. Their role in routine gastrostomy wound care clearly requires further study.

The present study found use of a wide range of dressings, including combine pads, calcium alginate, semi and non-permeable film, hydrocolloids, surgical tape and non-adhesive gauze. Some of these dressing selections suggest that clinicians may have been attempting to contain or manage exudate from these wounds. This is a common

problem with gastrostomy wounds where over-granulation and exudate contribute to the risk of infection¹⁷.

One problem with this study was the variability with which wound care practices were documented by nursing staff. Indeed, documentation of wound care practices generally could be described as poor. Whilst wound care practices for infected wounds tended to be documented more frequently, of the 19 infected wounds, the use of cleaning agents, topical antiseptics and dressings were not documented in 37%, 68% and 69% of cases, respectively. This failure to document might be interpreted as the care, having followed the recommended hospital protocol. However, as documented care frequently deviated from hospital recommendations, it is likely that undocumented care exhibited similar variation.

A factor that appears to compound the problem of variability in wound care practices is the lack of guidance from the hospital protocol with respect to infected wounds. This impacted on the study design, as a baseline for consistent practice for infected wounds could not be determined from the hospital protocol. Further, there was insufficient research evidence in the literature to enable the identification of optimal care strategies for gastrostomy site infections.

In summary, we found gastrostomy site infection occurred in almost one third of cases in our hospital cohort. Of particular concern is the diversity and variability in wound care practices that reflects a lack of evidence based consensus on the best methods of wound care. Whilst there is a hospital protocol to guide gastrostomy care practices, this protocol would appear to be adhered to infrequently. Whether variable adherence to the hospital care protocol has contributed to the incidence of infection is impossible to say, but clearly steps to ensure consistent wound care practices across our institution are needed. Further research is also clearly required to determine the optimum wound care strategies for gastrostomy site wounds. Such research should ideally comprise randomised controlled trials of various wound care strategies.

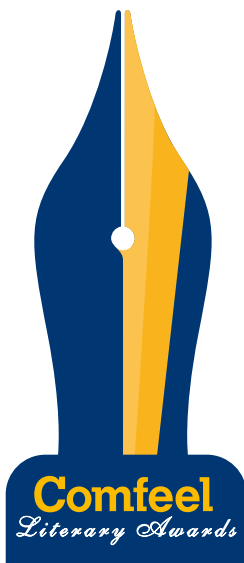
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