

## PRACTICE



## UNCERTAINTIES

# Do dressings prevent infection of closed primary wounds after surgery?

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After surgery, the wound must try to heal. A dressing may be applied, with the expectation of improved healing, management of exudate, or reduced chance of surgical site infection. Surgical site infection is of particular importance to health services and patient outcomes. However, whether dressings are necessary and influence these issues is uncertain. Here we discuss uncertainty about wound dressings in closed primary surgical wounds.

A closed primary surgical wound is formed when the skin edges of the surgical wound are approximated. Wounds may be closed with sutures or clips. Epithelisation and connective tissue deposition seal the join. The wound may then be covered with a dressing. Many different types are available (box 1).<sup>1</sup> Tissue adhesive “glue” may also be added as a dressing to a closed wound (fig 1⇓).

Theoretically, dressings might limit surgical site infection by providing a barrier to exogenous environmental contamination with bacteria, or they might increase surgical site infection by incubation of endogenous commensal organisms (that is, bacteria present from the time of surgery). However, a difficulty in designing any trial to answer this question is that surgical site infection is hard to define or diagnose. Surgical site infection is defined by localised signs (redness, heat, pain, and swelling, and pus may be visible). Diagnosis can be difficult and confusion arise because a naturally healing wound can exhibit some of the signs of infection and because microbiological confirmation of infection is difficult to obtain consistently. These challenges mean that existing measures of wound infection, although widely used, have limited validity and reliability.<sup>2-5</sup> Surgical site infection may be superficial, deep, or affecting an organ space. While superficial infection may be self-limiting and require minimal intervention, more serious surgical site infection requires re-operation and a prolonged hospital stay with a major cost to the health service.<sup>6,7</sup> Infection risk varies according to surgical procedure (clean, clean/contaminated, contaminated, or dirty), whether surgery is planned, and patient factors. After high risk, dirty-infected procedures (such as unplanned colorectal surgery), infection

risk may reach 25%, whereas the risk after elective clean surgery is typically less than 5% (for example, 4.4% for coronary artery bypass surgery and 1% for breast surgery).<sup>8</sup> If post-discharge surveillance is undertaken, increased rates of surgical site infection are noted for all procedures.

## What is the evidence of uncertainty?

A Cochrane systematic review summarising the evidence for the use of dressings or “no dressing” to prevent surgical site infection in people with closed primary surgical wounds was published in 2011 and updated in 2014.<sup>9,10</sup> Twenty randomised controlled trials were included. All were at an unclear or high risk of bias. Only two compared leaving wounds exposed (“no dressing”) with applying a dressing. The remainder compared one type of dressing with another; none reviewed tissue adhesive as a dressing. There was insufficient evidence to conclude which type of dressing reduced surgical site infection or whether dressings were needed at all. Evidence for the role of dressings to manage exudate or symptoms is lacking because validated and reliable measures of practical wound management and patient experience are not available.<sup>9,10</sup>

To supplement the review, we systematically searched for randomised controlled trials evaluating application of tissue adhesive as a dressing on closed primary surgical wounds (box 2). We screened 319 abstracts, reviewed 19 full papers, and included two trials.<sup>11,12</sup> Both were small (<100 patients), single centre, and limited to specific operations (adult abdominoplasty and paediatric laparoscopic appendectomy). Both were assessed as having a high or unclear risk of bias. For common operations, therefore, there is essentially no evidence about the effectiveness of tissue adhesive when used as a dressing.

The Cochrane review concluded that, because of the lack of evidence, current decision making about dressings may need to be informed (perhaps for pragmatic reasons) by practical issues such as wound symptom management and costs rather than surgical site infection.

**What you need to know**

- There is insufficient evidence to know whether dressings reduce the risk of surgical site infection in closed primary surgical wounds
- Basic adhesive dressings may be used on closed primary surgical wounds as a pragmatic approach to provide a barrier to the wound and to absorb exudate
- In specialties where it is common practice to not use dressings, continue with this practice until further evidence emerges

**Box 1: Summary of dressings types (from the *British National Formulary*\*)**

*Basic wound contact dressing*—Low adherence, usually cotton pads placed in contact with the wound, and may be absorbent

*Advanced wound dressings*\*:

- Hydrogel—Amorphous, cohesive topical application that can take up the shape of a wound
- Vapour permeable†—Allow the passage of water vapour and oxygen but are impermeable to water and micro-organisms
- Soft polymer—Include soft silicone polymer that may be adherent or non-adherent
- Hydrocolloid—Occlusive hydrocolloid layer on a vapour permeable film
- Foam—Contain hydrophilic polyurethane foam (adhesive or non-adhesive)
- Alginate—Highly absorbent calcium alginate or sodium alginate, can be combined with collagen
- Capillary action—Absorbent core of hydrophilic fibres sandwiched between low-adherent wound-contact layers
- Odour absorbent—Contain activated charcoal to absorb odour from wounds

*Antimicrobial dressings*—May contain honey, iodine, silver, and other antimicrobials

*Complex adjuvant therapies*—Topical negative pressure therapy

*Tissue adhesive as a dressing*—Topical skin adhesive

\*Defined according to their primary component. †Adhesive and may have absorbent properties recommended for closed primary surgical wounds

**Box 2: Search strategy for trials of tissue adhesive used as a dressing on a closed primary wound**

We undertook electronic searches in March 2015 in the Cochrane Wounds Group Specialized Register, Cochrane Central Register of Controlled Trials (CENTRAL), Ovid Medline and Ovid Medline 5, Ovid Embase, and EBSCO CINAHL databases for randomised controlled trials that compared the immediate postoperative application of wound dressings with tissue adhesive as a dressing to closed primary surgical wounds. We included studies of adults or children. The primary intervention was application of tissue adhesive as a dressing; we excluded trials where tissue adhesive was applied for the purpose of closing the wound.

**What are the practical issues and costs of wound dressings versus no dressing?**

Dressings may provide practical wound management and symptom control. Dressings absorb exudates and provide a barrier to being directly knocked or caught on something. They may reduce patient anxiety by covering the incision. Leaving a wound exposed without a dressing, however, may be beneficial by providing easy visualisation of the wound to aid prompt assessment of an impending problem and allay fears of what might be underneath the dressing. Not covering a closed wound after surgery may be especially important in children because it avoids the need for painful removal of dressings. It is possible that intentionally leaving a wound without a dressing may be coupled with greater care in skin closure at the end of surgery. Greater care with closure may reduce wound exudates, which in turn could negate the need for a dressing and improve healing.

Other issues to consider in choice of dressing is their cost. These vary greatly, from inexpensive basic wound contact dressings (a few pence each) to expensive advanced dressings (such as antimicrobial dressings) which may cost between £10 and £20 each.<sup>1</sup> Topical negative pressure therapy dressings are rarely used on closed primary surgical wounds (costing about £100 per week), although interest in them for high risk wounds (such as unplanned colorectal surgery) is increasing.

**Is ongoing research likely to provide relevant evidence?**

Searches conducted in September 2015 in the WHO International Clinical Trials Registry have identified only ongoing trials comparing advanced dressings (with one or more claimed therapeutic property) with basic wound contact

products. We did not find any trial comparing dressings with no dressing. A feasibility study which includes a pilot randomised controlled trial is currently being undertaken which will establish whether a definitive trial of different dressing types and no dressing in patients undergoing planned or unplanned abdominal general and caesarean section surgery is feasible and a worthwhile investment for the NHS.<sup>13</sup> Mixed methods are being used to explore current practice and views of dressings and to improve outcome measures.

**What dressings, if any, should we use in light of this uncertainty?**

Because there is so little evidence to guide the choice of dressing strategy for closed primary surgical wounds, we recommend a common sense approach until better evidence is available.

Without evidence of the superiority of more expensive dressings, and with anecdotal reports of the convenience of dressings for patients and health care staff, the use of basic adhesive (with minimal absorbency) dressings at a cost of a few pence per dressing on a closed primary surgical wounds is pragmatic. An exception to this recommendation would be settings in which it is standard practice not to use dressings, and paediatric surgery may constitute such an exception, if the removal of dressings causes undue distress to children.

The Bluebelle Study Group:

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### Recommendations for future research

A randomised controlled trial to evaluate the effectiveness and cost effectiveness of different dressings or no dressing to reduce surgical site infection in patients undergoing elective or unplanned non-implant based surgery. Outcomes of interest include

- The feasibility of establishing a valid and reliable patient reported outcome measure to assess surgical site infection after hospital discharge
- The feasibility of developing an accurate and easy to use tool to assess symptoms and practical wound management issues in the early postoperative setting
- Cost effectiveness of a major trial of dressing use and strategy for the NHS

### How patients were involved in the creation of this article

Five patients who had undergone surgery were interviewed as part of the Bluebelle study<sup>13</sup> to explore their views of dressings or no dressing. They discussed it in a group and provided comments and suggestions, but these did not affect the content of this article.

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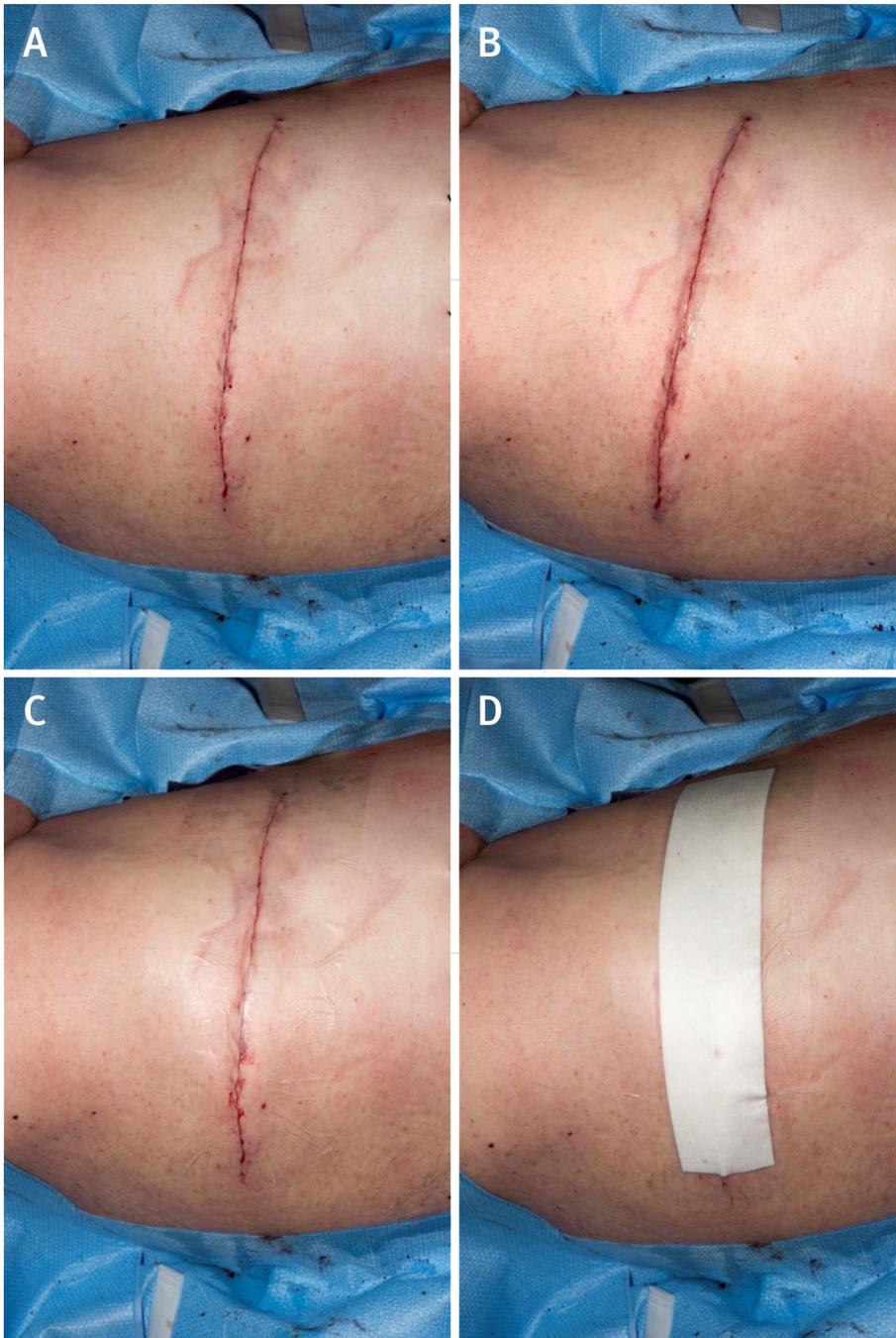
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**Figure**

**Fig 1** Images of a closed primary surgical wound (a) without a dressing, (b) with tissue adhesive added “as a dressing,” (c) with an adherent and transparent dressing, and (d) with an adherent and absorbent dressing