SKIN GRAFT & DONOR SITE

Addendum to the
OCB WOUND CARE PROTOCOL

Médecins sans Frontières
2018
NEONATES, SEVERELY MALNOURISHED CHILDREN & UNDER FIVES WITH LARGE WOUNDS_v1.0
Addendum to the
MSF-OCB WOUND CARE PROTOCOL

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FOREWORD

This protocol aims to guide the treatment of skin grafts and donor sites encountered in the field in coherence with the general MSF wound care protocol. This will make it easier for paramedical staff, including nurses and nurse-aids, as well as doctors, to perform wound care in any context as long as the materials are available.

All recommendations about the general wound care technique (e.g. aseptic technique, pre and post care including pain management, IPC and organizational aspects of the procedure,…) are available in the “OCB Wound Care Protocol, 2018”.
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List of abbreviations

FTG  Full thickness graft
OT   Operating Theatre
PTG  Partial thickness graft

List of icons

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Book" /></td>
<td>Chapter index</td>
</tr>
<tr>
<td><img src="image2.png" alt="Warning" /></td>
<td>Attention point</td>
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<td><img src="image3.png" alt="Bandage" /></td>
<td>Action</td>
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</table>
Summary of the general wound care protocol

The following 3 steps are the same for all types of wounds, regardless the aetiology of the wound, location of the wound, chronic or acute wounds, etc.

Step 1 – ASSESS: factors influencing wound healing and pain management

The wound should not be treated in isolation but in the context of the patient’s overall wellbeing. Before deciding on any wound action, products and materials, the clinician must undertake and document a holistic assessment of the patient. To obtain optimal wound healing conditions, comorbidities and underlying diseases must be treated together with the wound.

This step includes also pain assessment and the administration of pain medication before wound care is performed. Correct pain management can improve the patient condition and facilitates and accelerates the wound healing process.

Step 2 – OBSERVE & ACT: TIME assessment, wound cleansing and disinfection (if necessary)

Cleansing can be done mechanically, or by irrigation; whether with NaCl 0,9% only or in combination with povidone iodine (PVI) 7,5% soap. Indications for each product are described in the protocol.

Disinfection is indicated only for non-healing wounds, wounds with signs of infection or for cases with specific influencing factors and increased risk of infection.

<table>
<thead>
<tr>
<th>TIME</th>
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<tbody>
<tr>
<td>T</td>
<td>Tissue viability</td>
</tr>
<tr>
<td>I</td>
<td>Infection prevention and management</td>
</tr>
<tr>
<td>M</td>
<td>Moisture balance</td>
</tr>
<tr>
<td>E</td>
<td>Edges</td>
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Step 3 – DRESSING CHOICE: hydrate/absorb and protect the wound

The dressing should offer mechanical protection of the wound, be impermeable to micro-organisms and avoid pain and trauma during its removal.

Moreover, it should respect the principle of moist wound healing by adding moisture when the wound is too dry, maintaining a good moisture balance in moderately moist wounds and absorbing exudate when the wound is too wet.
Holistic approach

‘You need to treat the whole patient and not just the hole in the patient’.
(Dowsett & Newton, 2005)

The healing process is the result of a complex interaction between the patient and wound-related factors, the treatment used, and the skills and knowledge of healthcare professionals. Thus, wound management requires a holistic approach.

This wound care protocol mainly focuses on aspects related to the wound. Nevertheless, the other factors that can influence wound healing should also be taken into account to ensure optimal wound healing.

**Factors influencing wound healing**

<table>
<thead>
<tr>
<th>Category</th>
<th>Factors</th>
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<tbody>
<tr>
<td>Patient related</td>
<td>Pathology, comorbidity, malnutrition, allergy, medication, psychosocial aspects, pain, coping</td>
</tr>
<tr>
<td>Wound related</td>
<td>Type, size (surface and depth), wound bed condition, ischemia, oedema, infection, anatomical site, treatment response</td>
</tr>
<tr>
<td>Health care professional related</td>
<td>Skills, knowledge and multidisciplinary care (nurse, doctor, physiotherapist,…), supervision</td>
</tr>
<tr>
<td>Resources/treatment related</td>
<td>Availability of material, suitability, effectiveness</td>
</tr>
<tr>
<td>Environmental related</td>
<td>Hygiene, cold / hot weather, humidity</td>
</tr>
</tbody>
</table>

Please refer to the *MSF-OCB Wound Care protocol* for more information about the holistic approach and more details on each of the influencing factors.
Definitions

Skin grafting is a method used to cover wounds that cannot be closed directly.

A skin graft is a section of epidermis and dermis which has been completely separated from its blood supply in one part of the body, the donor site, before being transplanted to a wound on another part of the body, its recipient site.

Indications

- Coverage of extensive wounds, unsuitable for closure by suturing;
- Coverage of deep second degree and third degree burns;
- Coverage of wounds which are likely to cause physical or psychological problems through scarring.

Some important concepts

Autograft

The donor and recipient of the skin graft is the same person, e.g. when a patient has a skin graft taken from his thigh which is applied to a wound on their lower leg.

Partial-thickness graft (PTG)

Involves excision of the epidermis and varying depths of the dermis, but leaves behind sufficient dermis in the wound bed to enable the donor site to re-epithelialize itself (see picture 1).

The most common donor site areas for partial-thickness skin grafts include the thigh, buttock, back, upper arm, forearm and abdominal wall.

The thicker the graft, the less it will contract and the more it will resemble normal skin in colour and texture; but the risk of graft and donor site healing failure is bigger. On the other hand, thinner grafts will ‘take’ easier, but contract and deform easier than thick ones and have a poorer functional and aesthetic result.

✓ Thin partial-thickness grafts are used for large areas and when the development of a contracture or quality of skin cover is less important.

✓ Thick partial-thickness grafts are used when skin quality is important, such as over flexion creases where contractures should be avoided.
**Full sheet skin grafts (unmeshed grafts)**
The size of the donor skin is about the same size as the wound to be covered: the skin is not stretched.

- **Advantage:**
  - Less scar formation.
- **Disadvantages:**
  - Drainage of blood and wound exudate is not possible. A collection of blood or wound exudate beneath the graft can result in no/insufficient ‘take’ of the skin graft.

  To prevent this, small incisions can be made into the graft (perforated non expanded skin grafts).

  A very precise haemostasis during the operation and an early verification (no removal!) of the dressing the first day after the operation can also prevent difficulties.

  - Need for a larger donor site than meshed skin does.

- **Indications:**
  - The most visible parts of the body (face, neck and hands).
  - When a wound is small and there is plenty of donor skin available, a sheet graft can be used to cover the entire area.

**Meshed skin grafts**
The skin from the donor site can be stretched to allow it to cover an area larger than itself. This can be done either manually or with a mechanical mesher. Multiple small fenestrations (holes) are inserted into the skin graft, by using a scalpel blade or a meshing device. Healing occurs as the spaces between the mesh fill in with new skin growth (see picture 2).

- **Advantages:**
  - Meshing of the graft is particularly useful in cases where there is insufficient autograft to completely cover raw areas, such as large wounds or burns.
  - Allows blood and body fluids to drain from under the skin grafts, preventing development of hematoma or seroma (= collection of serous fluid) and graft loss.

- **Disadvantage:**
  - Less durable than a sheet graft and the larger the mesh, the greater the permanent scarring (the skin retains a meshed appearance).
Full-thickness graft (FTG)

It consists of the epidermis and the full thickness of the dermis (see picture 3).

Since none of the reticular dermis remains to allow spontaneous regeneration of skin, the wound must be closed primarily or by PTG. Consequently, the surgeon must select a donor site where a small elliptical area of skin may be excised and the wound closed to leave minimal scarring or a PTG will be required.

Common donor site areas for full-thickness skin grafts include the pre- and post-auricular (ear), supraclavicular and antecubital (inner elbow) areas, the upper eyelid, scalp, groin and areola.

✓ Advantages:
  o More of the original characteristics of the skin are preserved (including hair and sweat glands).
  o Full-thickness skin grafts do not contract as much as partial-thickness skin grafts, so are best for a good cosmetic result in the face, or to cover a sensitive functional area on the hands, fingers, face or neck.

✓ Disadvantage:
  o More difficult to ‘take’ and available donor sites are limited.

The ‘take’ of a skin graft

The “take” of a skin graft means the adherence of the skin graft to the recipient site. It relies on the uptake of a new blood supply from that area (see picture 4).
For a skin graft to adhere successfully to the wound bed, some conditions must be satisfied:

- Enough vascularization to produce granulation tissue: a graft does not ‘take’, unless it is re-vascularised starting from the tissues to which it has been attached. If a graft is placed on non- or poorly-vascularised tissues, it inevitably fails.
- The wound bed should be clean and free from necrotic or sloughy tissue.
- The wound shouldn’t be haemorrhagic or oozing (except for leg ulcers).
- Absence of infection.
- The graft must be held in close continuous contact with the wound bed and immobilized (e.g. by sutures, staples and clips and an appropriate dressing).

Certain tissues cannot ‘take’ skin grafts, especially avascular areas, such as hyaline cartilage, exposed tendon without sheath, and exposed bone cortex without periosteum. These cases will require some form of flap for closure.

Successful adherence of the graft to the wound bed is determined by colour and immobility.

**Picture 4 - Process of skin graft “take”:** early skin graft nourishment by diffusion from the recipient site until revascularization has occurred at 5-10 days, depending on the thickness of the skin graft (Holden, 2015)
CHAPTER 1 - Wound care: skin graft

NOTA BENE:
This document focuses on dressing changes and material for covering and fixation. Cleaning and disinfection should always be performed according to the general wound care protocol.

First dressing change
Next dressing
Follow-up
When to call a doctor

The initial focus of the management of this type of wound is on facilitating the process of the ‘take’ of the skin graft.

Immediately after the placement of the graft a gentle compressive dressing* is applied, which ensures complete contact between the graft and the site to keep the graft in place and to allow capillaries to invade the graft.

* One layer of paraffin gauze + absorbent compress(es) on top + fixation with bandages.

✓ Stop drugs which increase the risk of bleeding in the first 5 days to prevent hematoma (and thus graft failure).
✓ Provide adequate analgesia to avoid the risk of elevated blood pressure due to pain.
✓ Consider the bleeding potential with the use of non-steroidal anti-inflammatory drugs such as ibuprofen or diclofenac.

First dressing change

First dressing change of the skin graft site is usually between the 5th and 10th day postop (according to the instructions of the surgeon).

✓ It is ideal to leave the graft undisturbed for the first 5-7 days postop to optimize graft ‘take’, but if clinically indicated, inspection of the skin graft can be done earlier.

The timing of the first inspection depends on the wound site (doubtful vs good quality), the thickness of the skin graft, how the skin graft has been immobilized, risk of infection, the age of the patient and the existence of underlying medical conditions that could delay healing.

Also if there is any concern about infection or if the dressing becomes soiled/ wet or too loose, the dressing should be changed earlier.

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1 Simple non-woven compresses or ABSORBENT DRESSING, (large/medium/small), sterile, s.u.NON-WOVEN ADHESIVE or both
**Important issues to consider during the first 5-7 days:**

- The recipient site should be immobilized by appropriate dressings.
- Ensure good fixation of the dressing to prevent shearing of the graft away from the newly-developing blood supply.
- Inspect the dressing at least 3 times a day and in case of pain.
- Reduce mobility in areas where movement might disturb the graft [e.g. plaster of Paris, splint]
- Take steps to reduce swelling (e.g. elevation).
- Avoid any pressure on the recipient site (e.g. prevent the patient from lying on the site).
- For a graft of the lower limbs: raise the feet from the bed.

- The first examination is conducted in the presence of the surgeon in the operating room (large or complex grafts) or bedside (smaller or simple grafts).
- Give a painkiller one hour before the examination. If necessary, anaesthesia can be provided.
- The overlying dressings are carefully removed using two sterile tweezers or sterile gloves: one that holds the graft and presses gently against the recipient site and one that loosens the dressing.
- If they are firmly adhered to the graft by dried blood or exudate they may need to be soaked away with NaCl 0,9%.

The wound is carefully re-covered with one layer of paraffin gauze + non-woven compresse(s)/ absorbent dressing + bandage.

**Next dressings**

After 5-7 days the graft should adhere to the recipient site. This is an estimate: the timing that the final revascularization occurs is variable.

**What to apply on the graft after the first 5-10 days will depend on the graft itself.**

Primary and secondary dressing selection depends on the stability of the graft, the amount of exudate and the presence of infection. The priority remains on continuing adherence and ongoing vascularization of the graft while simultaneously caring for a non-viable graft or areas where the graft has not adhered.

Dressing every 3 to 4 days (or as decided by surgeon): the overlying dressings are carefully removed and the wound is recovered with one layer of paraffin gauze + non-woven compresse(s)/ absorbent dressing + bandage(s).

**Careful handling** can reduce graft disturbance: use a technique that removes the dressing from the graft without lifting the graft from the recipient site.

If necessary soak dressings to remove them without damaging the wound bed.

Uneven grafts with crevices need the secondary dressing to come into contact with the whole surface of the wound bed. This can be achieved by using compresses and fluffing them, as opposed to laying it in flat sheets (*see Picture 5*).
In undulated grafts with crevices (a), the secondary dressing should be in contact with the entire wound surface, which can be achieved by fluffing or balling the gauze rather than laying it in sheets (b) (Holden, 2015).

Secondary dressings hold the graft in place and soak up the exudate that transfers through the primary dressing.

Good fixation is important!

✓ All dressings must be well secured to prevent the primary and secondary dressings from slipping.
✓ Bandage limbs joint to joint.
✓ When using adhesives, ensure they are adequate to secure the dressing.
✓ With the patient’s consent, remove hair when using adhesives because poor fixation will cause friction and graft loss.

After a week (7-10 days): remove staples/stiches and debris (confirm with surgeon)

✓ This includes staples or stitches (including dissolvable ones) used to anchor the graft, as they no longer have a role (always check before with the surgeon).
✓ Excess skin beyond the recipient bed that has dried needs to be removed by lifting with sterile tweezers and cutting along the edge with sterile scissors (see picture 6).
✓ Within the graft there will be loose skin and debris that will lift spontaneously with moisturizing or can be gently removed with sterile tweezers (see picture 7).

Picture 5 - In undulated grafts with crevices (a), the secondary dressing should be in contact with the entire wound surface, which can be achieved by fluffing or balling the gauze rather than laying it in sheets (b) (Holden, 2015).

Picture 6 - Excess, overlapped dry skin needs to be trimmed (Holden, 2015).

Picture 7 - Loose skin and debris should be lifted with tweezers (Holden, 2015).
What if the ‘take’ of the skin graft is less than 100%?

If the skin graft has only been partially successful in covering a wound area, it will require dressings to encourage epithelialization of the whole wound.

In this case, follow the general WOUND CARE PROTOCOL!

Follow-up

Once the whole skin graft site has regained full skin integrity it will no longer require dressings, unless it is in an area of the body which may be subjected to mechanical stress (e.g. clothes rubbing).

Gentle, regular massage with an emollient will help the graft to become supple.

When to contact a doctor?

✓ Collection of blood or seroma under the graft: the collection of fluid will prevent capillary link up and graft failure is inevitable if this problem is not solved.
✓ At any sign of infection.
NOTA BENE:
This document focuses on dressing changes and material for covering and fixation. Cleaning and disinfection should always be performed according to the general wound care protocol.

Dressing in OT
First dressing change
Next dressing changes
When to call a doctor

Management of full thickness donor sites
If directly closed: managing in the same way as any other surgical wounds healing by primary intention.
If closed with PTG: cfr. supra.

Management of partial-thickness donor sites
Partial-thickness skin graft donor sites heal by secondary intention, where re-epithelialization occurs from the edges and via the epidermal appendages left in the remaining layers of dermis. Consequently, the more dermis that is removed, the longer the healing time.

The expected healing trajectory will range from 7 to 21 days, depending on the thickness of the graft taken and patient factors that impact on healing, together with how the wound is managed.

The donor site wound is likely to be more painful than the graft site wound due to the exposure of sensory nerve endings.

In the first 3-4 days post-surgery, the donor site wound produces moderate to heavy amounts of exudate, depending on the size of the wound area. After this, exudate levels diminish as re-epithelialization progresses.

Dressing in OT

Immediately after harvesting of the skin graft:
✓ Haemostasis should be applied by adrenaline soaked compresses and pressure (e.g. diluted Epinephrine, 1 ml of 1:1000 Epinephrine in 500 ml of normal saline).
✓ Apply one layer of paraffin gauze, cover it with non-woven compresses or an absorbent compress and fixate with bandages.
**First dressing change**

- **Timing:** day 5-10 postop (same as for the graft site)
- **Exception:** earlier if signs of infection, soiled/ moistened dressing,…
- **Exudate:**
  - + or ++: only change the secondary dressing. Leave the paraffin gauze in place.
  - +++: change the secondary dressing + paraffin gauze (only if it comes off spontaneously!).

**Next dressing changes**

- **Timing:** Change secondary dressing if soiled/ moistened.
- **Leave paraffin gauze in place. The paraffin gauze will comes off spontaneously once the wound is healed.**

Avoid **bandages** in dressing fixation on a thigh donor site. The shape of thighs do not lend to circumferential bandaging.

If bandages are applied intra-operatively, they will start slipping once the patient starts to mobilize.

Removing these bandages and re-securing the dressing with adhesive tapes, can prevent the slippage caused by heavy dressings and gravity once the patient is mobile.

**Over-grafted donor sites:** if the surgeon has extra skin once the recipient site is covered, it may be applied on top of the original donor site.

Manage over-grafted donor sites primarily as a donor site to promote re-epithelialization throughout the wound.

**Protection of fragile donor sites:** as long as there is concern the wound may break down newly-healed donor sites need to be protected by dressings.

Once healed, donor sites need regular moisturizing to improve integrity or they will develop hyperkeratosis with the potential for wound breakdown.

**When to contact a doctor?**

Immediately when there are signs of non-healing wound and/ or infection.
CHAPTER 3 – Patient education

Skin graft

Patients should be given the following information/advices:

- Skin grafts do not mirror the surrounding skin.
- As the graft matures, the colours settle and the area contracts.
- If a large amount of devitalized tissue or a lesion has been removed there may be a significant depression to the normal outline.
- When the skin graft has not been taken.
- The newly healed graft is vulnerable. Protection depends on the part of the body affected, so dressings may be needed in certain areas even once the wound has healed until such time as it is less fragile.
- Once the skin graft site no longer requires dressings: wash and dry it carefully and apply an emollient regularly as the area initially tends to be very dry.
- In case of partial-thickness grafts the lack of sweat glands involves the graft will always tend to be dry, so moisturising may be required for long term.
- If available, use a full sun block cream for at least one year, especially if the area is likely to be exposed to the sun (e.g. the face).

Donor site

Patients should be given the following information/advices:

- In order to heal the original wound a second wound must be created, which will also produce a scar.
- The donor site wound may be more uncomfortable (painful) than the graft site wound.
- There is a potential for dressings to become wet with a slight odour.
- When it is recently healed, the donor site wound will appear dry, very pink and will be possibly itchy. It does not appear the same as the rest of the skin, but this is normal.
- The colour will change over time, although a permanent change in colour is likely.
- Although the wound may be itchy it is best not to scratch as the new skin is fragile and may be broken by scratching. Regular application of emollients may help.
- The skin should be washed using a neutral soap and then patted dry rather than rubbed.
- Avoid sun contact and – if available – apply a total sun block cream for the first year to avoid burning.

CHAPTER 3 – Summary of the skin graft and donor site care
<table>
<thead>
<tr>
<th>Recipient site</th>
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<tbody>
<tr>
<td><strong>OT</strong></td>
</tr>
<tr>
<td><strong>First dressing</strong>&lt;br&gt;Follow surgeon’s instructions.&lt;br&gt;Between the 5th and 10th day postop.&lt;br&gt;Ideal: leave graft undisturbed for the first 5-7 days.&lt;br&gt;Exception: earlier if signs of infection, soiled/ moistened dressing, etc..&lt;br&gt;Surgeon in OT or bedside.</td>
</tr>
<tr>
<td><strong>Next dressings</strong>&lt;br&gt;Every 3-4 days (or as decided by surgeon).</td>
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<tr>
<td><strong>After 7-10 days</strong> (check with surgeon)</td>
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<tr>
<td>Once the whole skin graft site has regained full skin integrity.</td>
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</table>

\(^2\) Simple non-woven compresses or ABSORBENT DRESSING, (large/medium/small), sterile, s.u.NON-WOVEN ADHESIVE or both
<table>
<thead>
<tr>
<th>Donor site</th>
<th>Immediately after harvesting of the skin graft:</th>
</tr>
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<tbody>
<tr>
<td>OT</td>
<td>1. hemostasis by adrenaline (dilution: cfr. supra) soaked compresses + pressure</td>
</tr>
<tr>
<td></td>
<td>2. one layer of paraffin gauze</td>
</tr>
<tr>
<td></td>
<td>3. + non-woven compresses /absorbent compress</td>
</tr>
<tr>
<td></td>
<td>4. + fixation with bandages.</td>
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</tbody>
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<thead>
<tr>
<th>First dressing</th>
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<tbody>
<tr>
<td>Same moment as first dressing graft site: day 5-10 postop.</td>
</tr>
<tr>
<td>Exception: earlier if signs of infection, soiled/moistened dressing, etc..</td>
</tr>
<tr>
<td>✓ Exudate + or ++:</td>
</tr>
<tr>
<td>1. only change the secondary dressing</td>
</tr>
<tr>
<td>2. leave the paraffin gauze in place.</td>
</tr>
<tr>
<td>✓ Exudate +++: change the secondary dressing + paraffin gauze (only if it comes off spontaneously!).</td>
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<th>Next dressings</th>
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<tbody>
<tr>
<td>Change secondary dressing if soiled/moistened.</td>
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<tr>
<td>Leave paraffin gauze in place. The paraffin gauze will come off spontaneously once the wound is healed.</td>
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<td>As long as there is concern the wound may break down newly-healed donor sites need to be protected by dressings.</td>
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<tr>
<th>Once the wound is healed</th>
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<tr>
<td>Gently wash the skin once a day using a neutral soap and then pat dry rather than rubbing.</td>
</tr>
<tr>
<td>Apply a non-perfumed moisturising/emollient cream (e.g. vaseline or shea butter) at least twice a day.</td>
</tr>
<tr>
<td>Avoid sun contact and – if available – apply full sun block cream for the first year to avoid burning.</td>
</tr>
</tbody>
</table>
REFERENCES

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Heck, C., personal communication, July, 4, 2016

LIST OF EXTRA READINGS

To be completed