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Assessing the evidence:

Cracked Nipples and Moist Wound Healing

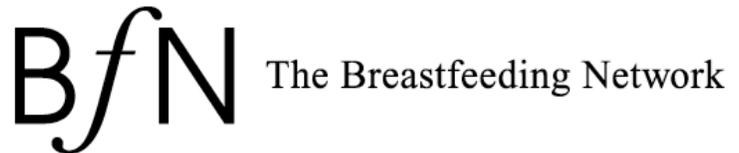
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Cracked Nipples and Moist Wound Healing

Supporting women with cracked nipples is such a large part of our work, it is surprising how little certainty there is on the best method of healing them. We know that adjusting positioning is crucial to avoid any further damage. An established wound that is slow to heal may be a sign of continued friction. So, start with watching a whole feed to see whether fresh injury is happening and if so, at what stage. Sometimes it's when latching on, other times during a feed, or maybe it's towards the end when the baby is getting sleepy and the mother's arm relaxes downwards. Watching for any changes in suckling and swallowing will give further clues. Usually a more comfortable position can be found, but the wound may have been established for some weeks before we become involved. In these circumstances we can offer support while working towards comfortable feeding. Part of the feeding assessment should include looking into the baby's mouth to check for a high palate or tongue-tie.

Many women with cracked nipples want to know if there is anything they can put on the wound to speed up healing. A typical response might have been to suggest air drying or expressed breastmilk (EBM). However, when looking at the research we have a dilemma. A few years ago the available information on treatments was clear: In the Royal College of Midwives handbook, *Successful Breastfeeding* (2nd edition, 1991, page 58), the section on treatment of sore nipples states "No randomised trial has yet been done to assess the usefulness of any of the creams, sprays, lotions or ointments [in current use] ... there is no scientific basis for their use. Nor is there any scientific evidence to support the use of expressed breastmilk or colostrum on the nipples after feeding." The 3rd edition (2002) now agrees that there is a strong theoretical basis for moist wound healing techniques though they have yet to be evaluated in the context of RCT's. Murray Enkin's *A Guide to Effective Care in Pregnancy and Childbirth* (3rd edition 2000, p507), still relegates nipple creams and ointments to Table 6: Forms of care likely to be ineffective or harmful. However Renfrew, Woolridge, and Ross McGill (2000) consider new evidence that the presence of 'epidermal growth factor' in breastmilk has potential therapeutic benefit in promoting the growth and repair of skin cells. This growth factor appears to be passively transported from the circulation into breastmilk as levels measured are constant over weeks and throughout a day's feeds.

Mohrbacher and Stock (1997) retract information in the previous edition on keeping the skin dry when sore, cracked or bleeding and add that research into moist wound healing results in wounds healing 50% faster when the internal moisture of the skin is maintained.

All books agree that no product is a substitute for finding and correcting the cause of soreness. The aim of this article is to help women achieve pain free effective breastfeeding.

Sore or cracked?

There is a move towards using moist wound healing for cracked nipples. At this point it is worth distinguishing between **sore** (unbroken skin) or **cracked** (wounded, broken skin) nipples. Many of the text books discuss sore, rather than cracked nipples or include sore and cracked nipples together (see above). This is reflected in the design of many research studies into moist wound healing, so it is perhaps not surprising that results are often inconclusive.

Mohrbacher and Stock (1997) now say, 'keeping the skin dry is no longer recommended for nipple soreness' while reminding us that many creams and ointments sold for the treatment of sore nipples may actually contribute to the problem. (page 394). Yet sore nipples should be able to heal without creams, providing help is given with positioning to prevent a crack developing. Renfrew, Woolridge, Ross McGill (2000) find it plausible that this process (of moist wound healing) may have contributed to the previously reported claims by women that oil based formulations (eg lanolin, 'Calendula', 'Kamillosan') are beneficial with nipple soreness.

Any study which suggests that using a moisturiser would help women with sore nipples should compare subsequent rates of cracked nipples in each group, as well as levels of pain. There

appears to be no such study. It seems probable that the main use of moisturisers (or other forms of skin care) should be when the skin is broken as a result of nipple trauma, especially when prevented from healing by repeated damage. Renfrew, Woolridge, Ross McGill (2000) agree that no controlled studies of adequate size have been published to date.

Compare this with general health care, where the principles of moist wound healing are well established. The importance of a moist environment for wound healing was identified by the work of George Winter (*Nature*, 1962, 193, 293-294.). He compared the effect of leaving superficial wounds exposed to form a scab, with the effect of applying a vapour-permeable film dressing (on a pig). The wounds healed twice as quickly when kept humid. The dressing maintained humidity on the wound surface, allowing skin cells to slide across the surface of the wound. With a scab, the cells had to go deeper under all the dry crust and dead skin to find a moist layer (ref 6, p79).

Ideal skin care would allow moisture to be retained, without making the skin 'soggy' (or macerated) – like when a plaster has been on the skin too long, or feet go wrinkly in the bath. This moisture prevents a hard scab forming. When applying this to cracked nipples, a softer wound has an extra advantage. There is less risk of further damage happening during breastfeeding as there is no hard scab to pull off during a feed, taking the new skin cells lying underneath with it.

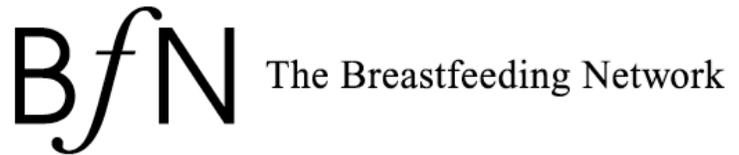
Keeping the wound moist also reduces pain by keeping air from drying out the exposed nerve endings (then more pain as it rehydrates) (ref 6, p80). Just as grazed knees are really nippy when going into the bath, but don't hurt so much once underwater, keeping a cracked nipple moist avoids it being re-wetted every time the baby latches on. We are, however, unaware of any study that has looked at this specifically.

Two ways of wound healing

Normally a new wound heals when the edges close together. An established wound heals from the base upwards, with the new skin growing over the edges, so they look smooth - often described as a rolled edge. As these wounds look like they are healing relatively slowly, women can feel disheartened. It helps to explain this and to look for the wound getting shallower. These wounds are most likely to benefit from moist wound healing, allowing the skin cells to glide over each other.

Newly healed wounds are not as strong as normal skin, so can re-open if the baby slips when feeding. This is more likely to happen when the mother or baby is sleepy. Feeding lying side-on may help reduce the chance of this happening during night-time feeds.

While the wound is healing, it sometimes helps to talk about a pain scale – imagine a ruler numbered 0 to 10, with 10 being unbearable pain. Suggest trying to drop down the scale at each feed so the mother can see a progression towards no pain at all. Correcting the position should give her an instant drop someway down the scale but not necessarily to 0. Depending on the extent of the wound, it may take some time before she reaches 0. If pain stays the same, or increases, ask her to contact you again.



Expressing versus continued breastfeeding

Expressing is sometimes suggested as an option to 'rest' the nipple. Finding a comfortable feeding position however, is usually less trouble than expressing milk, which puts suction on the wound. Breastfeeding only involves suction at the very beginning of the feed, as the nipple and areola are drawn into the baby's mouth to form a teat. Once the milk begins to flow the negative pressure is relieved and the nipple should be well into the baby's mouth, safe from any further damage (ref 12, Chap 80, p1362).

Possible treatments

The table reviews the different moist wound healing treatments available. Choosing a moisturiser is not easy. Perhaps the first suggestion for mothers would be either white soft paraffin (Vaseline) or Lansinoh. There is no study however, that compares these two options or that indicates lansinoh will be more effective. Vaseline is widely used in wound care, either directly, or as a base for other creams. Lanolin is also used as a base, but concerns over allergic responses and high levels of contaminants (ref 2 and 7) limit its use. Lansinoh is a purified anhydrous version. The revised edition of the Breastfeeding Answer Book warns that Vaseline is unsuitable because it "keeps out air" (ref 2, page 163) and is "not safe for ingestion" (page 395). Unfortunately, these comments are not referenced and the standard reference book for drugs, *Martindales Pharmacopoeia*, makes no reference to this. Softened paraffin is likely to stay on the surface of the skin longer than lansinoh but this is what makes it so useful in preventing hard scab formation. It is worth noting that white soft paraffin, or its unbleached version yellow soft paraffin, has been widely used over many years for lip care in special care baby units – if it was unsafe for ingestion why is it used directly on babies lips? White soft paraffin is widely available and cheap (a small tin currently costs 99p) while Lansinoh costs between £5-£10 and is harder to obtain.

Sue Huml, Lactation Consultant for Lansinoh, believes "Petrolatum [Vaseline] is occlusive (prevents any air reaching the wound/skin). Lansinoh is semi-occlusive, allowing oxygen and water transpiration. Petrolatum remains on the surface of the skin. Lansinoh penetrates the stratum corneum and in a study was found to penetrate into the stratum granulosum, where in can hold moisture already in the skin In lanolin sensitive patients researchers were unable to elicit a single allergic response."

Conclusion

As we all know, correcting positioning is paramount in allowing a damaged nipple to heal and enable pain free, effective breastfeeding. Sore nipples alone are unlikely to need further treatment, no evidence exists to support the use of creams, spays or ointments to prevent or treat nipple soreness (11). Cracked nipples may benefit from applying a moisturiser such as white soft paraffin (Vaseline) or Lansinoh. Some women may not like a particular choice of treatment. It may be useful to check whether they have any allergies to creams or cosmetics. Creams can be tested on their inner arm, but bear in mind that healthy skin is often less likely to react than damaged skin.

This is certainly an area in urgent need of systematic review and further, independent, research.

We would like to hear from anyone with any experience of moist wound healing, with examples of what worked or not. We would like to collect this information. It's your experiences that will help us learn.

Moist Wound Healing Treatments: a Review (November 1999, revised May 2001)

Product	Use/comment	Evidence
Expressed breast milk	Expressed breast milk has no risk of allergy, contains antibodies and 'epidermal growth factor' which potentially may promote the growth and repair of skin cells.(1) Using expressed breastmilk encourages hand expressing – may have benefits not considered in studies of nipple healing. Is used in many cultures on skin irritations (2) .	USP-modified lanolin, warm compresses, and expressed breast milk with air drying were compared to a control group (177 women with sore nipples) (3) . Results No differences in pain or duration of breastfeeding. Exclusive breastfeeding rather than partial was a better predictor of breastfeeding beyond 6 weeks. Conclusion Clinicians should discontinue recommending creams and ointments, since these have not been proved to be effective...and may only present an unnecessary nuisance and expense for the mother.
White soft paraffin (Vaseline) Use in tube form where possible. Widely available.	Might try next after breast milk. Good at preventing scab formation which may be pulled off during a feed causing further damage.	Compared white soft paraffin to antibiotic creams in general wound healing (884 women) (4) . Results No skin reaction to Vaseline was found when confirmed by patch tests. Only 0.9% reacted in the antibiotic group.
Yellow soft paraffin This is the unbleached form of Vaseline. Available in hospitals and pharmacies.	This is used in special care baby units as a moisturiser on babies' lips. See above re scab formation	Not tested on nipple wounds although in common usage. Compared reactions to yellow and white soft paraffin on 3 people with known sensitivity to yellow soft paraffin (5) . Results Within each brand purification meant less sensitivity, may mean white soft paraffin is preferable to yellow.
Jelonet Gauze square soaked in yellow soft paraffin. Comes in foil pack or tin Available on prescription, or from pharmacies.	Useful on open, established cracks; should help stop the wound sticking to a breast pad. Use folded in double layer to stop drying out, if it still sticks try something else. Change at each feed. See illustration in (6)	Has been used as a wound dressing for many years. One book claims it does not maintain a moist wound environment, not as popular in general wound care because it can stick to the surface of larger wounds (7, p 85) .
Lansinoh Claims to be a highly purified form of lanolin, although allergies may still be possible. Substitutes are widely available in high street chemists and supermarkets and unlikely to be effective.	Claims to be absorbed more effectively than Vaseline and that Vaseline needs to be washed off – no evidence of this. See text Advertised in baby magazines. Look out for various substitutes purporting to be pure lanolin-some are diluted by other compounds i.e. liquid paraffin	Several studies published but have design shortcomings. No study found which compared Lansinoh to the soft paraffin group. One unpublished thesis compared Lansinoh to expressed breast milk (8) and (9) . Results Cracked nipples took on average 1-2 days quicker to heal with Lansinoh. Delay in publication has been prolonged which must cast doubts on its methodology.

Product	Use/comment	Evidence
<p>Creams such as Kamilloosan, Calendula and other similar brands. Widely available</p>	<p>No scientific evidence exists for their use. Look for ingredients that should not be ingested by babies – vitamins, peanut oil. Many stores have own brand versions. Kamilloosan no longer contains peanut oil.</p>	<p>Referred to in (1) (11) (12) and (13).</p>
<p>Hydrogel A dressing of gel granules which can be applied to the cracked nipple. Large water content. May feel cold to touch. Expensive. Available from pharmacies e.g. as NuGel, market is still developing</p>	<p>Various papers warn of the risk of the baby choking if the mother is sleepy enough to forget to take it off. Seems remote given that it would be held in place by a bra and breast pad which would have to be removed. Will absorb some wound fluid/ milk. Good at moistening a dry wound. Used for open and established wounds (granulating wounds). New dressings designed and marketed specifically for breastfeeding are being marketed in some countries. Some advantages are claimed for dressings containing glycerine, as these residues are considered safer.</p>	<p>Compared hydrogel dressings with standard hospital care of lansinoh plus breast shells. (10) Results Stopped early because of increased infections in the hydrogel dressing group. Two groups each with 21 mothers. Worth checking whether there is an explanation for this, eg how often the pads were changed.</p>
<p>Sprays Rotorsept and other sprays</p>	<p>Sprays have an alcohol base which is drying to the skin, may be more likely to cause cracking. May alter the normal skin bacteria</p>	<p>(1) (11) (12) (13)</p>
<p>Antibiotic creams Fucidin tulle Only available from GP's.</p> <p>Antibiotic dressings Yellow soft paraffin squares impregnated with fucidin</p>	<p>Not in general use in the UK but is more common in America and through information found on internet sites.</p> <p>Expensive, can cause skin reactions, increase the risk of bacterial resistance.</p> <p>Wipe off excess cream before the next feed but don't wash off or it may further damage skin.</p> <p>Tulle gauze used like jelonet – doubled over and kept under breast pad.</p> <p>May be used instead of a Jelonet type dressing if the wound is superficially infected. (11)</p>	<p>Study A randomised trial with 922 patients divided into 440 having white petrolatum (wsp) and 444 bactricin - an antibiotic cream(ac) Results The rate of infection was similar in both groups (2%wsp v 0.9%ac, not sig). Antibiotic creams were associated with infections that were more serious and expensive to treat. No patient in the wsp group developed an allergic reaction but 4 did in the antibiotic group. (4). In a study of treatments for infected sore nipples (confirmed by lab culture) better healing was achieved in the group taking antibiotic tablets rather than creams (14). Letter states study was too small to be conclusive(15)</p>

If using any of the above creams apply after feeds. They do not need to be washed off before the next feed, though if using creams/ gauze containing antibiotics its worth wiping off any excess before a feed (see above).

Care of cracked nipples

- Get a Breastfeeding Supporter to watch a whole feed – even good positioning may be made better.
- Use only water when washing - soap will dry the skin further.
- Massage the breast gently and/or hand express a little milk to shorten the time between the baby latching on and milk beginning to flow.
- Feed when the baby first stirs rather than when really wide awake – so the baby feeds in a more relaxed way.
- Feed from the least painful side first.
- After a feed, try expressing some milk, and let it dry on the nipple.

Treat the cracked nipple like a cracked lip - protect it with white soft paraffin (Vaseline) or Lansinoh ointment after each feed (ref 2, page 395).

Try anaesthetising the nipple with ice wrapped in a cloth before a feed.

Consider pain relief, e.g. Paracetamol or Ibuprofen at least 30mins before a feed is expected, and at regular intervals.

Change breast pads at each feed.

If the wound becomes inflamed, or weeps pus, this may be a sign of a bacterial infection and may need a prescription for antibiotics.

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Phyll Buchanan, Anabel Hands and Wendy Jones, Breastfeeding Network Supporters.

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