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Water for the World

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Photo: Dr Paul Buxton

Queen of Sheba's pool, Gondar

Some say the next World War will be about water. Much of the world has water that is undrinkable. Even when it is plentiful, as in the Pakistan floods, it remains a threat to survival through its effect on crops and cattle and the spread of diseases such as cholera. ***More than 4,000 children die every day from diseases caused by unsafe drinking water.***

Several years ago, Procter and Gamble developed through their Health Sciences Institute a new technology where a small quantity of powder is stirred into filthy water for a few minutes, precipitating impurities including bacteria, viruses, protozoa and heavy metals such as arsenic and pesticides. Within 30 minutes, 10 litres of water fit for drinking is available through the use of a small sachet of this agent, branded as PUR® and made available to the most needy on a not-for-profit basis through the Children's Safe Drinking Water program.

Since 2004, more than 130 million sachets have been provided — enough to purify 1.3 billion litres of water. Efforts in this area are continuing, and P&G has committed to provide more than 3.5 billion litres of purified water (350 million sachets of PUR) by 2012.

We in dermatology need water for washing and for skin disease, wounds and burns and, importantly, it should be water fit for drinking.

The article by Jill Brooks, who has used PUR® for washing wounds in an African hospital, found significant advantages for this approach where it not only provided a ready substitute for sterile bottled water, but also a significant cost-saving.

In preliminary studies, it was found that washing the human body is of apparent lower priority to populations vs providing water for cattle and minimal drinking water for humans. It is, nevertheless, an essential tool in skin care especially when, after washing, an emollient is added (see Ryan "The first Commandment, Oil it!). In this respect, Procter and Gamble is also moving to provide glycerin, a low-cost humectant-emollient with a raft of other skin benefits including antimicrobial properties.

Filthy water is usually boiled and this requires fuel. It contributes to deforestation and collecting wood is a huge burden to local populations, especially when it has to be foraged and carried over several kilometres. With PUR® available, boiling becomes unnecessary. Indeed, wounds need water at body temperature.

One further point – don't waste it. Even when pouring water from a container on to the hands, most of it spills on to the ground. If poured slowly onto a cotton towel or onto paper or even onto a sponge of lichen, however, water is conserved to a great extent. In this way, it is possible to wash the whole body with only 100ml of water.

Most nations have a PUR® distributor from whom this product can be obtained. Those who have access to the internet should Google the Children's Safe Drinking Water program or PUR® and read more.

Contents

Water fit for drinking is fit for washing wounds! A case study at a Ugandan Hospital

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A Cochrane review of 11 trials (Fernandez and Griffiths, 2008) assessed the utility of tap water compared to other wound cleansing solutions. The study concluded that using tap water to cleanse acute wounds in adults did not increase infection rate. The reviewers concluded that where tap water is of drinkable quality it may be as beneficial as other methods such as sterile water or saline and more cost-effective. It is now used extensively in the UK for managing wounds.

As is well known, sourcing water fit for drinking in a resource-poor world is no easy matter, but a new low-cost technology has been developed and a humanitarian project launched several years ago is making it widely available. PUR® is a powdered water purification technology packaged in a 4g sachet, using ferric sulphate as a coagulant (neutralising charge on particulate matter, causing flocculation within 10 minutes under constant stirring) and calcium hypochlorite to impart residual chlorine as a disinfectant. One sachet treats up to 10 litres of contaminated water, virtually eliminating bacteria, viruses and protozoa, heavy metals and pesticides. PUR® was developed by Procter & Gamble (P&G) and is distributed via their Children's Safe Drinking Water program, focused on reducing sickness and death resulting from drinking contaminated water. It has recently been made available for trials in wound management.

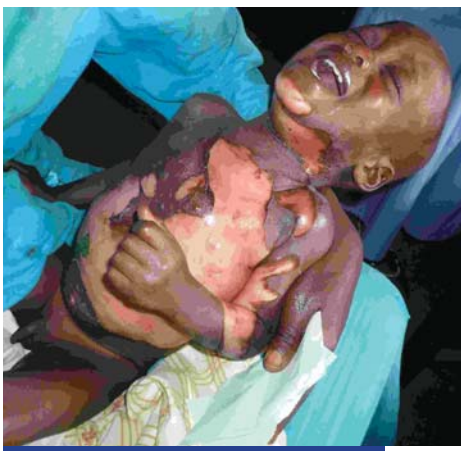
The benefits of this technology are evident. It is rapid, simple, ultimately portable, requiring no boiling and associated risks and environmental impact.

The International Foundation for Dermatology and the International Skin Care Nursing Group have signed a Memorandum of Understanding with P&G to investigate jointly its utility in skin care projects. There are many publications concerning its use to provide drinking water and various projects are now underway to confirm best practice for care of at-risk and compromised skin.

The project reported herein has shown the additional benefit of economy in the surgical ward of a 160 bed district hospital in Uganda. The hospital previously used expensive products such as sterile IV normal saline, *Savlon*® of variable dilutions and hydrogen peroxide for washing wounds and burns.

Prior agreement for this study was obtained from the Medical Director of the hospital. A teaching session was given on the preparation and use of the treated water at one of the weekly Continuing Medical Education meetings. This was attended by doctors, pharmacists, nurses, midwives and other qualified staff.

A member of the pharmacy staff was trained to prepare the water to be used for wound cleansing. Initially it was made up daily but this was later refined to alternate days. The surplus each day was stored in the refrigerator. The water was made up in a large, clean labelled container. The powder was added to tap water from the hospital's bore hole which was of indeterminable – though questionable – quality. As per PUR usage instructions, it was then stirred continually for 10 minutes during which a floc formed, containing microbial and chemical impurities. The floc was allowed to settle for a further 10 minutes before being strained through a clean piece of cotton cloth into another clean, labelled container. The used cloths were washed thoroughly in hot soapy water after each use and then rinsed and dried. The resulting treated water was poured into clean 0.5l labelled containers. Each day, at least 1.5l of treated water was delivered to the surgical ward. Any remaining water was used by the children's ward to reconstitute oral hydration fluids and in the last 2 weeks of the trial, 1.5 - 2l per day was used for wound cleansing in the minor operations theatre.



Child with superficial burns

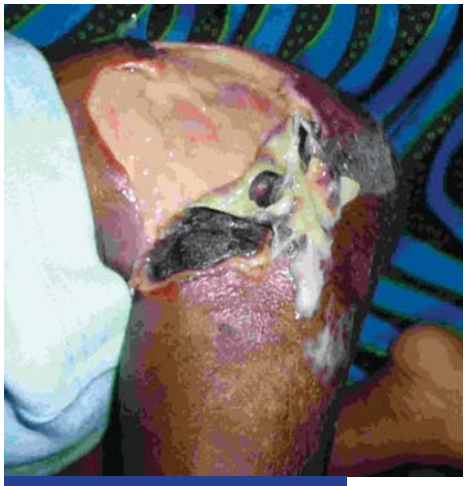
In the surgical ward, PUR®-treated water was used to clean the wounds of 32 patients over a 6 week period. The patients were of both sexes and all ages, the youngest being 14 months and the oldest 73 years. It was used for cleansing superficial wounds as well as for irrigating very deep and extensive sinuses. Some of the wounds were dressed twice daily, while others were dressed daily or less frequently depending on the amount of exudate and the general condition of the wound. The longest period of usage on any one patient was 29 days. The types of wounds treated included superficial burns, necrotic wounds on babies caused by poor injection practices, trauma wounds, surgical wounds of various types including those resulting from incised abscesses and haematomas, surgical amputations, surgically-debrided necrotic wounds which were the result of injections of paraffin, and surgical wounds from abdominal operations for peritonitis, some of which developed multiple fistulae. Additionally, because of a treatment fee, many patients discharged themselves before wounds were healed.

Microscopy, culture and sensitivity facilities were not available at the hospital.

All the wounds were dressed by the author.

Results

The water was prepared easily, with no issues, by a member of the pharmacy staff and was readily accepted as a cleansing agent by the nursing staff and the doctors. There was no noticeable rise in infection rates of wounds. Wounds that started clean remained clean. Infected wounds were



Infected injection site on baby

treated with IV antibiotics and all burns were treated with silver sulphadiazine cream.

The use of *Savlon®*, hydrogen peroxide and IV normal saline to clean wounds in the surgical ward ceased during the trial. In a normal 4 month period, the spend on wound-cleansing products in the surgical ward was as follows:

Hydrogen peroxide	7,865 Ugandan shillings
Savlon®	54,900 Ugandan shillings
IV normal saline (estimated)	76,500 Ugandan shillings
Total	**139,265 Ugandan shillings**

This equates to a saving of approximately 417GBP per annum* which, in a resource-poor country, is a very significant cost-saving. If the water was also used for wounds in the maternity ward and the minor operating theatre, the savings would be even greater.

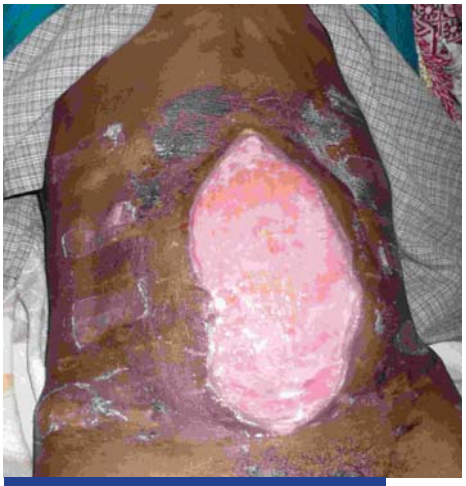
Conclusions

This simple, low-cost technology produces drinkable quality water from even the dirtiest source without the need for fuel and associated risks and environmental impact. It should be promoted for cleansing all wounds in the developing world. This would include wounds in patients with cutaneous leishmaniasis, yaws and Buruli ulcer. It should also be considered for skin cleansing in patients with skin diseases such as onchocerciasis and for facial washing, potentially reducing trachoma incidence. Clean water is especially useful as a cleanser where there are cracks and fissures in the skin. These act as possible entry points for microbes and are characteristic of elephantiasis (lymphatic filariasis, podoconiosis) and several other neglected tropical diseases such as leprosy.

** Exchange rate calculated at 1,000 Ugandan shillings to £1.*

Reference

Fernandez R, Griffiths R. Water for wound cleansing. *Cochrane Database of Systematic Reviews* 2008, Issue 1. Art. No.: CD003861. DOI: 10.1002/14651858.CD003861.pub2.



Dehisced wound with fistula

Deep & extensive surgically debrided wound on arm

Kamuli Hospital, Surgical/Trauma Ward

Age and sex of patient	Cause of wound	Type of wound and size (cms)	Result
14 year old F	Injection of paraffin into abdomen to procure an abortion	Abdominal sinus 8cms deep	Daily irrigation of sinus. Patient self discharged after 2 days
14 year old F	Peritonitis	Surgical wound 15 cms long	IV Antibiotics 5 days. Wound cleansed daily. Sutures removed at 10 days. Wound clean
6 year old M	Accident with boiling water	Superficial scald to left leg approx 10cms x 8cms	Wound cleansed daily. Silver sulphadiazine and paraffin gauze dressing. Self discharge after 2 days. Wound clean
32 year old F	Large malignant melanoma size of a grapefruit. Infected	Surgical wound 10 cms long	Antibiotics for 21 days. Sutures removed on post op day 4 as wound infected. Wound infected again on day 14 - explored and cleaned under GA. Wound cleaned with water and dressed daily for 29 days. Wound healed and clean on discharge.
18 year old M	Peritonitis	Dehisced wound on abdomen approx. 22cms x 15cms with sinus oozing pus	Post op antibiotics. Wound cleansed and dressed daily for 16 days. Self discharge post op day 17 with wound bed sloughy and sinus still discharging
50 year old M	Sigmoid volvulus	Surgical wound 16 cms long	Dressed for 2 days. Self discharge. Wound clean
20 year old M	Paralysis of legs ? Guillain-Barre syndrome	Grade 2 sacral pressure ulcer 5cms diameter	Cleansed daily and dressed - Slough on wound bed Self discharge day 4
20 year old M	Perforated peptic ulcer - peritonitis	Surgical	Wound leaking faecal fluid via several fistulae 6 days post op. Cleansed and 2 colostomy bags in situ. Patient RIP post op day 8

Kamuli Hospital, Surgical/Trauma Ward *continued*

Age and sex of patient	Cause of wound	Type of wound and size (cms)	Result
27 year old F	Motor bike accident.	Superficial exhaust burns Lt leg 16 cms x 9 cms plus minor cuts and abrasions to Rt ear and side of face and tips both shoulders	Wounds cleansed and dressed daily. Lt leg treated with silver sulphadiazine. Self discharge day 4.
30 year old M	Assault. Head injury	Wounds on head 4 cms long and arm 5cms long - sutured	Wounds cleaned and dressed daily . Patient RIP suddenly on day 3
4 year old F	Accident with hot milk	Superficial burns left leg 9cms x 7cms	Cleansed and dressed with Silver sulphadiazine and paraffin gauze for 2 days. Self discharge
60 year old F	Assault	Wound 5cms long on scalp	Wound sutured. Cleansed daily with water. Sutures removed on day 5. Wound clean
6 year old male	Pyomyositis Rt thigh	Deep wound approx 9cms deep and 5cms across.	Daily irrigation with water and packing which was gradually reduced to no packing and topical dressing alternate days then every 3 days. Wound epethieliazing well and virtually healed without infection on discharge. Parents taught to do dressing
4 year old M	Accident with boiling water	Superficial scalds with blistering to both hands back and front and all fingers	Cleansed daily and dressed with silver sulphadiazine and paraffin gauze for 10 days. No infection and healing well on self discharge
28 year old F	Ovarian mass	Surgical wound 15 cms long	2 days post op wound cleansed and dressed daily. Alternate sutures removed on day 7 and remainder on day 9. Well healed
56 year old F	CA Cervix	Surgical wound 15 cms long	Wound cleaned and redressed for 3 days prior to suture removal on post op day 10. Well healed
33 year old M	Infection Lt buttock and Rt arm following paraffin injection	Deep wounds to arm approx 7cms deep x 13cms diameter via incision 7cms and buttock approx 9cms deep and 17cms' diameter via incision approx 8 cms	Wounds irrigated and packed daily for 9 days. Packing discontinued and redressed only daily for further 11 days. Virtually healed without infection at self discharge.
10 year old M	Pyomyositis Lt thigh	Wound approx 4cms deep x 3cms	Wound irrigated daily for 5 days. Granulating well without infection. Self discharge
60 year old M	Lt inguinal hernia and Lt testicular tumour	Surgical wound14 cms long in groin and 9 cms long scrotum	Wounds cleansed with water and dressed daily x 4 – no infection. Self discharge
14 year old M	Abscess ear	Wound 2cms x 2 cms	Cleansed and dressed x 2 days. No infection. Self discharge
6 year old M	RTA- crush injury Rt index finger	Incision wound 8 cms long	Wound cleansed and dressed x 3. Wound clean. Self discharge
30 year old F	Bartholin's abscess	Wound approx 5cms x 2½ cms	Pack removed Wound irrigated daily with water x 4. No infection Discharged
18 months old M	Necrotic injection sites Rt buttock and Lt thigh	Wound lt thigh 2 ½ cms diameter Rt buttock 5cms diameter	Wounds cleansed and redressed daily x 2. Rt buttock wound bed yellow slough. Self discharge
60 year old F	Peritonitis	Wound 17 cms long. Faecal fistula developed 5 days post op	Wound cleansed with water. Stoma bags x 2 applied x 5 Self discharge
7 year old F	Rape victim. Vaginal, perineal and anal tears	Laporotomy wound 11 cms long	Daily irrigation of perineum. Cleaning and redressing of laparotomy wound x 7- healed with no infection
14 month old F	Malnourished child with necrotic injection site Lt buttock	Necrotic tissue approx 11cms in diameter lifting. Wound undermined at the edges 1cm to 2cms. Wound bed sloughy and pus oozing from edges of wound	Loose eschar removed and wound cleansed daily. Silver sulphadiazine applied under paraffin gauze. On antibiotics for 5 days. Wound clean at 5 days. Self discharge at 13 days. Wound bed clean and healing very slowly
29 year old M	RTA	Chin wound 9 cms long sutured. wound clean. Open jagged wound Rt elbow 5cms diameter	Chin wound clean. Wound on elbow irrigated daily and dressed On antibiotics x 5 days. Discharged
22 year old M	Strangulated hernia and gangenous bowel	Wound in groin 12 cms long. Scrotal wound 10cms long	Scrotal sepsis on day 4. – antibiotics. All sutures removed and to theatre for debridement and orchidectomy. Daily cleansing and dressing. On going
73 year old M	Superficial burns with blistering abdomen and hand	Wounds on hand 7cms x 6 cms. abdomen 20 cms x 5cms Wounds covered with soil.	Wounds cleansed with water, Silver sulphadiazine dressing. Discharge at 2 days
30 year old F	Bike accident. Haematoma on labia	Open wound 4 cms diameter and 3 cms deep	Pack removed. Twice daily irrigation. Wound clean on discharge at day 3
28 year old F	Bartholin's cyst	Open wound approx 4cms x 2cms	Pack removed. Twice daily irrigation Discharge at day 3. Wound clean.
52 year old F	Peritonitis	Wound 16 cms long.	Infected suture line at post day 5. Sutures removed. Antibiotics commenced. Wound cleansed daily x 4 days. Ongoing

SNAKEBITE

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Snakebite is an under-estimated and neglected public health issue that is responsible for substantial illness, death and socio-economic hardship. At least 420,000 envenomings and 20,000 deaths from snakebite occur each year. It is possible that these figures may be as high as 1,841,000 envenomings and 94,000 deaths especially in South and South East Asia and sub-Saharan Africa.

It particularly affects the rural poor and is an occupational hazard for many farmers, herders and other agricultural workers. The risk posed is often compounded by poor access to healthcare in remote areas, a scarcity of antivenom and delays in administration of any antivenom that is available.

In this article we will describe findings from our study of snakebite envenomation treated at a nurse-led rural clinic in Tanzania and also suggest simple steps to assist the patient and how to reduce risk factors for snakebite.

From our study of 85 snakebite patients attending the Meserani Snake Park Clinic in Tanzania *(Fig 1)* between 2007 and 2009, we found that 62% of patients could identify the snake that bit them and of these the puff adder *(Fig 2)* (Bitis arientans) caused 28% of bites, red spitting cobras *(Fig 3)* (Naja pallida)14% and black-necked spitting cobras *(Fig 4)*(Naja nigricollis 13%. There were also four bites (5%) from burrowing asps and two black mamba bites *(Fig 5)*. Thirty eight percent of patients were unable to identify the snake that bit them – often because they were bitten in the dark of night.

Fig 1. Maasaii snakebite patient at the Snake Park Clinic

The puff adder is particularly dangerous to rural workers as it is mainly nocturnal and rather than running away like most snakes it relies on camouflage and immobility for protection, so is easily accidentally trodden on.

In our study most bites (88%), occurred during the rainy season. This seasonal variation may relate to agricultural activity, which intensifies in the wetter months of the year, and also to the activity patterns of snakes which become more active in the wet season (when there is more food around) and tend to hibernate in the dry season. 64 (77%) of bites occurred at night.

Fig 2. Puff adder

Most of the cases were male with a male to female ratio of 1.4.The cases were aged 2-69 years with mean age of 23 years and 29 (35%) were children aged 12 years or younger.

Antivenom was given for symptoms of envenoming (see below) if patients presented within 24 hours, as after this it may not be effective. Forty-two of the snakebite cases received antivenom. Only one patient (1%) a 12-year –old girl was believed to have died as a result of snakebite but another six (7%) each required a skin graft *(Fig 6)* or amputation of a limb or digit. None of these patients had received antivenom because of delay in presentation.

Establishment of the Snake Park clinic appears to have improved access to snakebite treatment; patients travel long distances (mean 82 kilometers, range 2-550 kilometers) to reach the clinic, because of lack of antivenom elsewhere in Tanzania.

Treatment outcomes among the snakebite victims who attend the nurse-led clinic appear to be good. Early intervention with antivenom appears particularly useful in limiting the spread of tissue damage and necrosis in cytotoxic snakebites. *(Fig 7)* As well as giving antivenom, other treatments such as debridement, wound care, and treatment of wound infections all fall within the scope of the clinic.

Fig 3. Red spitting cobra

Fig 4. Black-necked spitting cobra

Fig 5. Black mamba

Symptoms following snakebites

Possibly up to a third of snakebites are "dry" bites –that is the snake does not inject any venom. If envenoming occurs there are broadly three main groups of symptoms following snakebite that depend on the species of snake involved in the bite.

1. Cytotoxic bites

(Puff adder, Spitting cobras, Gaboon vipers)

Cause dramatic swelling with watery blood leaking from the bite wound, blistering and discolouration. The patient will complain of severe pain in the limb and bite site and may be in shock. *(Fig. 8)*

2. Neurotoxic bites

(Mambas and most Cobras)

Cause moderate swelling at bite site, a cold clammy sweat, dilated pupils, drooping eyelids, aching joints, patient may complain skin is twitching, swollen lymph glands, vomiting, salivation, breathing difficulties.

3. Haemotoxic bites

(Saw-scaled Viper, Boomslang and Twig snake)

Cause bleeding e.g. gums, nose, corner of eyes, bleeding from scratches and old wounds.

Simple Steps to assist a snakebite patient

Stay calm and reassure the patient **BUT do not delay in getting medical help** preferably where there is antivenom available.

Do **NOT** apply tourniquets, scarification *(Fig. 9)*, electric shocks, emetics such as potassium permanganate, or snakestones. **These will either do more harm than good or may delay getting appropriate help.**

Remove the patient and onlookers from the vicinity of the snake and out of danger.

If the snake is dead take it in a container with the patient to the doctor but if the snake has hidden itself do not waste time looking for it.

If you are bitten by a dangerous snake while alone in the bush make your way slowly but steadily to where you can call for help.

Immobilise the bitten limb like a fracture (as this will minimize the absorption of the venom) with a sling for an arm or a splint for a leg or wrap both legs together. Remove any constrictions on the bitten area e.g. ring, watch, tight clothes.

Carry the patient on a stretcher..,

Watch the patient carefully. A sudden drop in blood pressure may cause the patient to feel faint. If so elevate the legs. If patient collapses put in the recovery position and keep airway clear.

If paralysis causes the patient to stop breathing maintain mouth-to-mouth resuscitation until a doctor is reached.

Tell the doctor of signs such as bleeding that develop on the way to hospital.

Summary

No tourniquets, cutting or sucking

Reassure the patient, ***I***mmobilise like a fracture, ***G***et to ***H***ospital fast, ***T***ell the doctor of signs such as bleeding or drooping eyelids that develop on the way to hospital.

Avoiding snakebites/living safely with snakes.

In the house:

Do not keep livestock – snakes can smell them and come into hunt.

Keep animals in secure pens at night a little distance from the house.

Keep food in containers to deter rats and mice.

Fig 6. Extensive tissue damage following a puff adder bite. No antivenom was given. Patient required skin graft

Fig 7. Minimal tissue damage after a puff adder bite to left ankle, in a patient who had been given early treatment with antivenom

SNAKEBITE *continued*

Raise the bed off the floor and use a mosquito net, also safeguards against scorpions and snakes.

In the compound:

Clear rubbish away from house and do not have piles of firewood, bricks etc where snakes can hide.

Cut down tree branches overhanging or touching the house.

Keep grass cut short around the house especially in the rainy season and clear underneath low bushes.

At night use a lamp or torch outside the house.

Wear shoes or boots especially in the rainy season.

In the bush:

Watch where your feet are treading- long thick grass or leaves may be hiding a snake *(Fig 6)*.

Don't put your hands in holes and look first before grasping a handful of grass to cut.

Do not wait for snakebite to happen before finding out if your doctor or rural clinic stocks antivenom. Antivenom is in short supply, is expensive and needs to kept refrigerated- many rural clinics do not stock it. Perhaps if bites are common in your area you may arrange a collection or obtain charitable funds to purchase a supply to store in a centrally located refrigerator. In this way one stock may supply a large area.

Useful web sites for more information:
http://www.bio-ken.com/

http://www.afro.who.int/en/divisions-a-programmes/dsd/essential-medicines/edm-publications.html

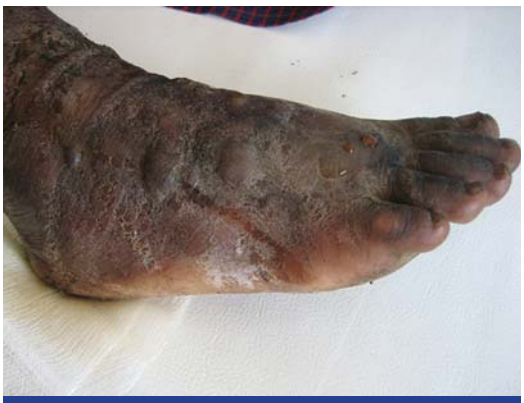

Fig 8. Patient with extensive cytotoxic tissue damage after bite from red spitting cobra

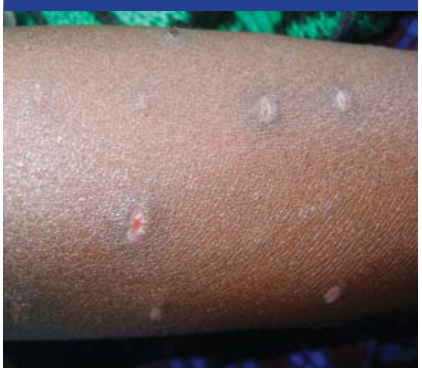

Fig 9. Patient who has received scarification from Traditional Healer. This can be dangerous causing infection and hemorrhage in haemotoxic bites

Management of Stevens-Johnson Syndrome and Toxic Epidermal Necrolysis in a Low Resourced Setting

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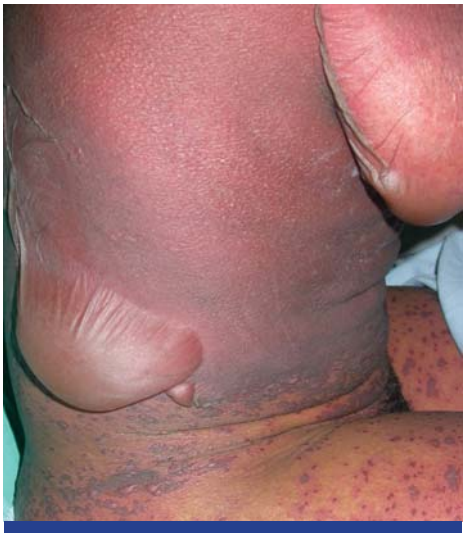

Photo: Courtesy of the University of Cape Town

Fig 1. Initial stages: dusky purple patches due to epidermal necrosis and flaccid blisters of epidermal detachment

Introduction

Stevens-Johnson syndrome (SJS) and toxic epidermal necrolysis (TEN) are acute life-threatening hypersensitivity reactions characterized by epidermal necrosis and detachment, with between 10% and 75% mortality.[1,2 2] TEN is a variant of SJS differing in the extent of the body surface involvement. SJS involves < 10% body surface area (BSA) while TEN involves > 30% BSA. SJS/TEN is an overlap of the two involving 10-30% epidermal detachment. Management of SJS and TEN varies amongst practices. Therapy in the developed world often involves more than the basic supportive care commonly practised in developing countries. This article describes current management guidelines at Groote Schuur Hospital, a low resourced tertiary hospital in South Africa.

Aetiology

Over 95% of cases are strongly associated with specific medications. These vary among countries as well as local regions and are highly dependent on the commonly prescribed medications and disease patterns within that region.[3] In South Africa, common causes include anti-tuberculosis (anti-TB) drugs, sulfonamides, anticonvulsants and antiretrovirals such as nevirapine. Other precipitants include bacterial, viral and fungal infection.[3] The pathogenesis is multifactorial, most likely involving a drug or metabolite-specific activation of T cells. A variety of constitutional and acquired factors possibly play a role in initiating an immune reaction to the drug or its metabolites.[4]

Management of Stevens-Johnson Syndrome and Toxic Epidermal Necrolysis in a Low Resourced Setting *continued*

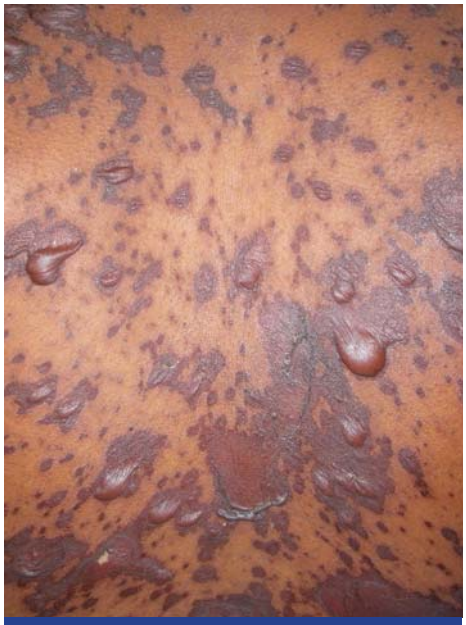

Photo: Courtesy of the University of Cape Town

Fig 2. Initial stages: dusky purple patches due to epidermal necrosis and flaccid blisters of epidermal detachment

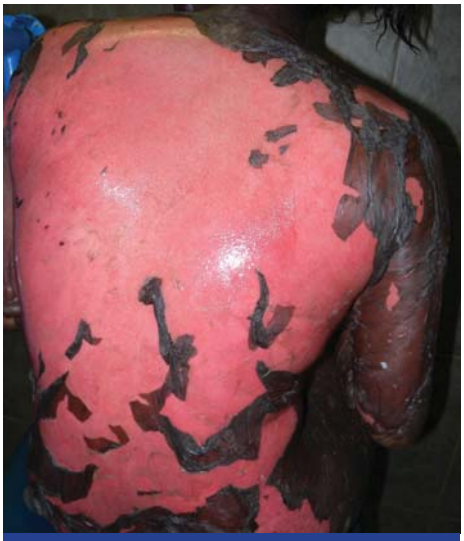

Photo: Courtesy of the University of Cape Town

Fig 3. Later stages: large areas of denuded skin and haemorrhagic erosions

These factors may trigger a cascade of mechanisms which result in severe cutaneous reaction such as SJS and TEN.

Clinical Features

The symptoms usually commence within 1-3 weeks of drug exposure.[1] The patient presents with a prodromal phase of fever, malaise, and sore throat often resembling flu. This is followed after 1-3 days by conjunctival burning or itching, skin tenderness or burning, mouth tenderness with a macular erythema progressing to a dusky purple/red colour.

Over time, the necrotic epidermis enlarges and coalesces to form raised flaccid blisters that spread with lateral pressure (*Figure 1*). These blisters may rupture and ooze resembling a burn (*Figures 2 and 3*). In the recovery phase, epithelial re-growth takes at least 3 weeks with delayed healing in pressure points and lips. Other systems that may be involved include kidneys (tubular necrosis, acute renal failure), respiratory/gastrointestinal tract (sloughing of epithelium with erosions), hair/nails (shedding of eyelashes and nails). (*Figure 4*)

Laboratory investigation may reveal anaemia, lymphopenia, neutropenia, increased serum urea, transaminitis and decreased serum bicarbonate.

Prognostic Factors

Seven risk factors aid in predicting mortality. These have been incorporated into a prognostic scoring system known as SCORTEN where 1 point is given for the presence of a parameter and 0 if it is absent.[5] These scores are repeated 3 days later, and include;

- Age > 40 years of age
- Heart Rate > 120/ minute
- Cancer or hematologic malignancy
- Initial epidermal detachment of > 10%
- Serum urea > 10mM
- Serum bicarbonate < 20mM
- Serum glucose > 14mM

A total score of 0-1 is associated with a low mortality rate of 3.2%; 2 points 12.2% mortality ; 3 points 35.8% mortality ; 4 points 58.3% mortality and more than 5 points 90% mortality.[5]

Management

Initial. Early diagnosis reduces mortality .[2,6,7,8] The first critical steps in the management of SJS and TEN are twofold;

- early withdrawal of offending drug
- immediate transfer to management in a specialised unit

These simple measures improve outcome tremendously. Subsequent management requires a team of knowledgeable, dedicated nurses as patients are incapable of accepting responsibility for any treatment or activities of daily living because of painful, incapacitating hand and foot involvement (*Figure 5*). Twenty four hour skilled nursing support with nurses dedicated to one or two patients at any one time, contributes significantly to low mortality outcomes. This is further augmented by intensive care specialist support for the management of septicaemic shock and other system failure complications.

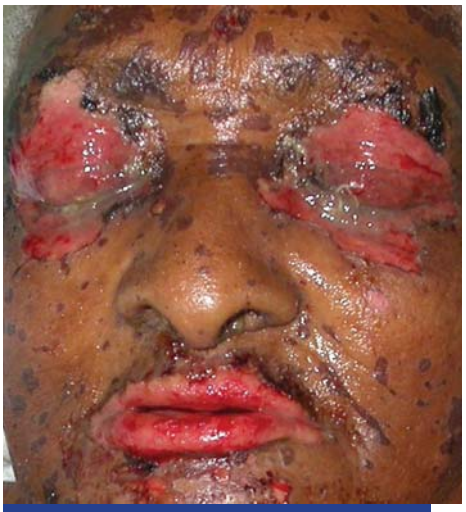

Photo: Courtesy of the University of Cape Town

Fig 4. Facial and eyelid involvement

Skin care. It is imperative that the exposed dermis and re-epithelialising skin is carefully protected to lessen the risk of further detachment and damage to regrowth. Daily baths (*Figure 6*) and the use of clean, sterile, non-adhesive dressing should be used as dictated by the soiling of bed linen from skin exudates. Dressings should be loosely draped over the body (*Figure 7*). Heat loss should be kept to a minimum and the environmental temperature controlled at 30°C.[8] All open areas should be monitored for signs of secondary infection with regular skin swabs. Results from the skin cultures should guide antibiotic therapy if systemic sepsis is suspected.[9]

Genital care. Good hygiene and use of non-adhesive dressings allows for healing of mucosal erosions. Every effort must be made to prevent adhesion in areas, e.g. the vulva, where two eroded surfaces are opposed. Our patients have at least two Sitz baths daily and ensure adhesions between eroded mucosal surfaces are broken down. We regularly examine the genital surface and orifices for adhesions so as to correct potential complications, such as phimosis in uncircumcised men.

Eye care. Conjunctival involvement ranges from mild to severe and may result in acute corneal ulcers (*Figure 8*), conjunctival melts or eye loss. General supportive care

includes 1-2 hourly bland lubrication and regular full range eye movements to prevent adhesions forming as well as early assessment by an ophthalmologist. Topical steroids are suggested under direction of the ophthalmologist in severe inflammation to counter the cytokine storm.[10] Contact lenses may be used to prevent synechiae. Established synechiae can be released with blunt instruments.[2,11] If corneal damage is persistently severe and/or corneal ulcers are non-healing, one may use amniotic membrane transplantation or contact lenses, respectively.[2,11] The patient needs to be educated about possible long term eye problems including xerophthalmia, ectropion, entropion, symblepharon, corneal opacity and pannus formation.[2]

Mouth care. Mild, medicated mouthwash should be used every 2 hours to clean the mouth. Antifungal therapy should be used if oral thrush develops. A lubricating cream can be used to soften haemorrhagic lip crusts prior to daily crust removal. Note that lip and mouth lesions tend to persist after other areas have re-epithelialised. Petroleum jelly impregnated gauze is useful to keep eroded lip surfaces separated and thus prevent adhesions.

Monitoring includes thorough and frequent assessment of vital signs, together with skin swabs and measurement of urine osmolality. Any signs of hypothermia, hypotension, confusion or diarrhoea require prompt intervention. Fluid balance: Total daily fluid intake and output are carefully monitored and charted to avoid dehydration and renal impairment.[2] Low urinary output may be due to dehydration, renal failure, urethral adhesions or voluntary inhibition of urination to avoid dysuria. Urine osmolality is an excellent marker of hydration and urine specific gravity must be maintained between 1.005 and 1.015. Every effort should be made to encourage oral fluids (100 to 200 ml every hour) rather than intravenous fluids as swallowing helps to keep the raw oesophagus clean and patent, preventing adhesions. Where dysphagia is a problem the use of naso-gastric fluids is preferred to prevent fluid overload.

Nutrition. Maintenance of a good nutritional status has been shown in burns patients to facilitate healing and is strongly recommended for SJS/TEN patients.[8,12] A fluid based diet is preferable as it helps to control the complication of dysphagia and painful swallowing.[2,8] Avoid very hot or cold foods, which only worsen pain. Rough, abrasive foods should be replaced with moist, soft foods. If the nutritional requirements cannot be met by these simple measures, enteral feeding may be considered.

Pain management. Pain control is integral to the management of SJS/TEN. It must be individualised, taking into consideration the needs of the patient, available administration routes, risk of respiratory suppression and monitoring facilities. In a non-ICU setting full consciousness is preferable as is oral therapy. Oral transmucosal, short-acting, medium potency opioids are best for procedural pain. Anxiolytics such as low-dose benzodiazepines or regular hydroxyzine can be added for patients with high pre-procedure anxiety and high baseline pain scores. Longer-acting, mild to moderate-potency opioids together with paracetamol can be given for persistently severe pain.

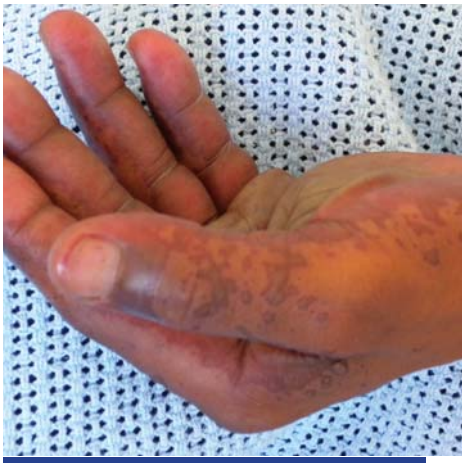

Photo: Courtesy of the University of Cape Town

Fig 5. Blisters and erosions on hand, which may lead to contracture

Intravenous (IV) lines. IV lines are a source of infection, and they are only indicated for patients that are not taking enough fluids. Specific indications include a confirmed infection needing parenteral antibiotics or resuscitation.

Antibiotics are best given for proven infections; the choice of antibiotic should be directed by microbiologic findings from skin , sputum, urine or blood.[7,8,9]

Respiratory system. Patients may present with tracheobrachial mucosal necrosis, pulmonary oedema, adult respiratory distress syndrome and infectious pneumonia or pneumonitis. Pooling of saliva and secretions may predispose to aspiration hence the

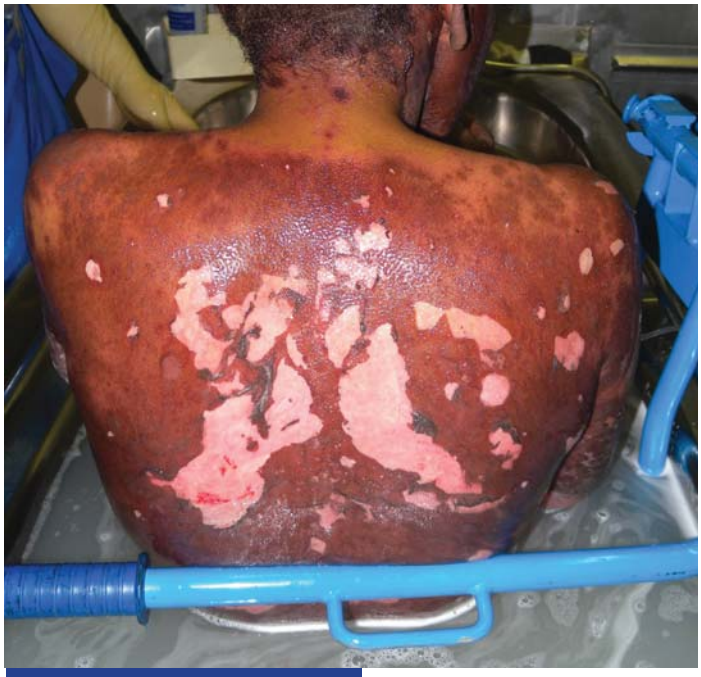

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Fig 6. Patient being assisted with bathing

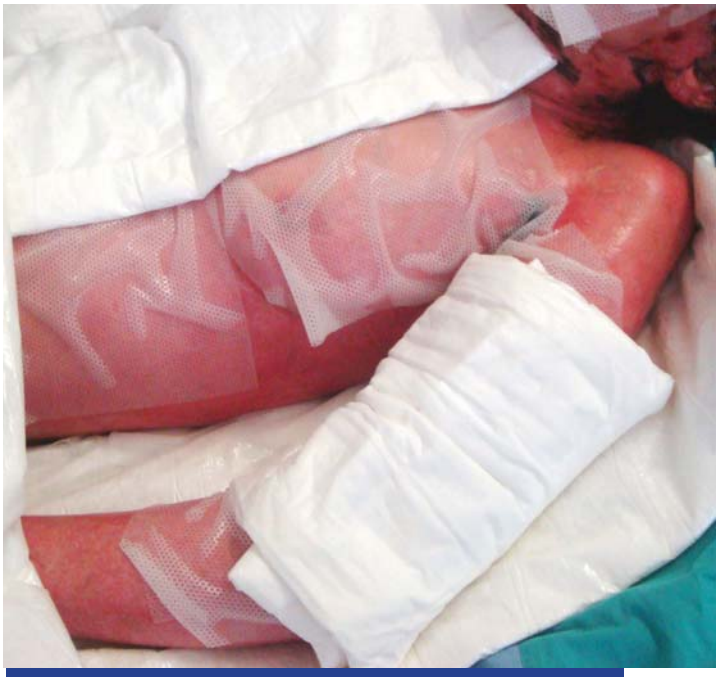

Photo: Courtesy of the University of Cape Town

Fig 7. Patient dressings (non-adherent dressings and sterile surgical sheets)

need for frequent clearing of secretions by dedicated nurses.

Mobilisation. The patient should be encouraged to move as much as possible. Initially this may require passive exercises with the help of the nursing team. Thereafter the patient should sit out of bed as soon as possible and mobilise as soon as healing of the skin permits.

Emotional support. It is important to reassure the patient and family by taking time to explain the cause and educate about preventive measures. A Social Worker or Clinical Psychologist may be valuable.

Future Management

Medic Alert. It is the responsibility of the attending doctor to facilitate prevention of recurrences by issuing a medic alert bracelet or disc (*Figure 9)* and educating the patient about the causative agent.[2]

Management of Stevens-Johnson Syndrome and Toxic Epidermal Necrolysis in a Low Resourced Setting *continued*

Rechallenging. It is advised that patients are never rechallenged. However, due to the limitation of available and effective anti-TB drugs and antiretrovirals, it is difficult to avoid these drugs completely. Rechallenge must be closely supervised by an experienced team. Guidelines for drug rechallenge must be strictly adhered to, to minimise recurrence risk.[13]

Summary and conclusions

SJS and TEN are acute life threatening reactions that require vigilant management including early identification and withdrawal of the offending drug, supportive care and frequent reassessment to ensure all medical needs of the patient are met. Following good nursing practice and regular simple procedures, patient survival and outcomes in a limited resource setting can be as good as for less limited and better resourced approaches.

A significant contributing factor to a good outcome is 24 hour dedicated nursing from a team of nurses expert in skin care management. The nurse to patient ratio should be as for high care and ICU settings due to the intense nursing required. Burn-out is common amongst nurses asked to nurse these patients with less staff. Using nurses unskilled in skin management adds to poor patient outcome. It is also advisable that SJS/TEN patients are managed by a team which includes expert dermatologists, physicians and intensivists.

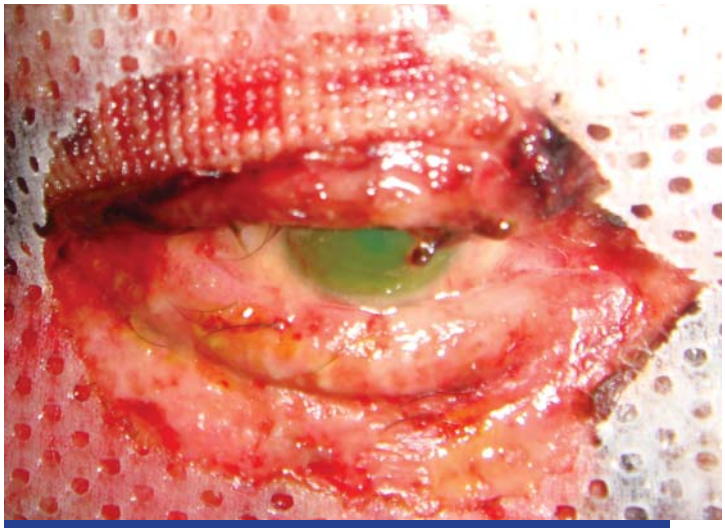

Photo: Courtesy of the University of Cape Town

Fig 8. Inflamed conjunctiva and eroded periorbital skin, conjunctiva and cornea needing 2 hourly eye care

Photo: Courtesy of the University of Cape Town

Fig 9. Example of a Medic Alert bracelet

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Sterilisation of Banana Leaves

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Sterilisation using a steam cooker

Scope

The use of banana leaves as wound dressings offers a number of advantages compared to commercially manufactured dressings.

- Less pain during dressing change
- No adherence to the wound
- Easy handling
- No delay of wound healing
- No increased infection rate
- Very cheap, and easily available

This Standard Operation Procedure describes various methods to sterilise banana leaves depending on the kind of use (immediately on site or in stock) and the local resources.

Preparation of the banana leaves (Necessary for all methods of subsequent sterilisation)

Carefully clean the leaf under (warm) running tap water, do not use a detergent.

Cut it into appropriately sized pieces.

Sterilisation using an autoclave

Pieces can be packed or wrapped using

- sterilisation paper ("blue sheets")
- self-sealing pouches
- rigid containers (use a cotton cloth inside the container)
- cotton cloth, if nothing else available **(Note: cotton is not a sterile barrier)**

If more than one piece should be sterilized, put "glove paper" between the leaves to avoid sticking together.

Autoclave at 121°C for 15 min holding time.

Do not store the unopened sterile pack for longer than 48 hours.

Once opened, the leaves in the package or container should not be used for longer than 8 hours (loss of sterility!).

Sterilisation using a steam cooker

Put leaves together with some (tap) water into the pot, and close the lid firmly.

Put the cooker on the heat supply and wait until steam escapes through the valve (the cooker "whistles").

Reduce the heat (the cooker will whistle at intervals), keep it cooking for 15 min and remove the cooker from the heater. Let it cool down until no steam escapes when you raise the valve – until the cooker has cooled and is no longer under pressure.

Remove the sterilised leaf(s) from the pot.

If you don't use all leaves, close the lid immediately and do not use the leaves for longer than 8 hours. Disinfect your hands before touching the leaves.

The cooking water left in the pot is also sterile and may be used for wound cleaning.

"Sterilisation" under emergency conditions or when a steriliser is not available

"Bubble" the leaves in a closed cooking pot or saucepan for at least 15 min and proceed as described above.

Note: Boiling is high-level disinfection rather than sterilisation! Bacterial spores (tetanus, gas gangrene) survive boiling temperatures. Therefore you should not practise the boiling method as a routine.

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Cochrane Review on Interventions for Old World Leishmaniasis

Treatments for old world leishmaniasis (due to *Leishmania tropica* and *L. major*) have been reviewed recently (González et al 2008). Although many treatments have been used there is a dearth of randomised controlled trials (RCTs) and the reviewers advocate international standardised studies. The reviewers stress that cutaneous lesions, particularly in the zoonotic form, can heal spontaneously.

There is reasonable RCT evidence for using oral itraconazole (200mg od for 6 weeks) for *L tropica*. Intralesional sodium stibogluconate is more effective than intramuscular administration. In *L major* infections, there is reasonable RCT evidence for oral fluconazole (200mg od for 4 weeks), topical paromomycin 15% plus methylbenzethonium chloride 12% (bd for 4 weeks) or weekly photodynamic therapy (PDT, for 4 weeks). PDT appears more effective than the topical treatments. A host of other treatments, including cryotherapy, allopurinol and herbal creams, remain unproven.

Photo: Chris Lovell

Cutaneous leishmaniasis in Ethiopia

Reference:

González U, Pinart M, Reveiz L, Alvar J (2008) Interventions for Old World Cutaneous leishmaniasis. Cochrane Database of Systematic Reviews Issue 4. Art No. CD005067. DOI; 10.1002/14651858. CD005067.pub3, summarized in Clinical and Experimental Dermatology **36**:569-570. CRL