Malawi is a small landlocked country in Central Africa with a population of approximately 14 million people. Life expectancy has fallen to around 37 years as a result of the ravages of poverty, malaria, and HIV/AIDS.

**Clinical challenges**
Like most developing countries, Malawi is suffering a road trauma epidemic. Most of this is treated conservatively by orthopedic clinical officers (OCO’s), but complex articular injuries and nonunions are referred for surgical intervention. Orthopedic sepsis is a huge issue, both from late-presenting and under-treated open fractures, as is primary septic arthritis and osteomyelitis, mostly in children. With half the population under 18 years of age, common problems are club foot, angular limb deformities, burn contractures, chronic osteomyelitis, congenital deformities, and sequelae of trauma. The seroprevalence of HIV is around 22% in the adult trauma population which creates challenges, particularly in the treatment of open fractures.

[CONTINUED ON PAGE 2]
This issue of the AO Dialogue is a result of the reorganization of the AO Foundation. As specialization has become more prevalent, the AO Foundation has reorganized into its four specialties: Trauma, Craniomaxillofacial, Spine and Veterinary. Each specialty has requested full clinical and technical responsibility. This means that the AO Dialogue Expert Section will be transferred to the specialties. Consequently, the Dialogue will take on a new look; becoming the newsletter for the AO Foundation. Its purpose is to keep you abreast of activities, issues and services provided by the service departments within the Foundation as well as important events that occur around the world within the specialties and the regional groups. This issue highlights some of the AO Foundation’s activities in developing nations. It shows how AO’s Social Economic Committee has been instrumental in advancing educational activities in Africa, as well as, in cooperation with our producer, helping to promote better patient care in various countries. Furthermore the AO Foundation, through AO Dialogue, has partnered with SIGN to help enhance clinical research for surgeons in developing countries.

As editor, I hope that you will appreciate and enjoy the new format of the AO Dialogue.

James F Kellam
Editor-in-Chief
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Clinical resources

The Government operates four referral hospitals and a network of district hospitals. Two of the referral hospitals have one or more orthopedic surgeons and can undertake some operative cases. All district hospitals have one or two OCO’s on staff. The Beit Cure International Hospital (BCIH) in Blantyre is a Christian Mission hospital specializing in children’s orthopedic surgery, offering a referral service for the whole country, and partnering with district hospital clinics. Children do not pay for treatment—the hospital aims to reach the poorest and most disabled children—so adult patients pay, in order to fund this work. BCIH and the College of Medicine in Blantyre provide a residency program and both place a strong emphasis on appropriate clinical research. Blantyre leads the way in world clinical research into HIV related orthopedic conditions—other areas of research include musculoskeletal infection, club foot, and a national arthroplasty registry. The aim is to develop a centre of excellence stimulating improved standards across the nation and region.

Contribution of AO

With help from the SEC, BCIH hosted its first operating room personnel (ORP) course in 2003 and has hosted one a year since—this also serves the other countries in our region. In the last six years a core group of our ORPs have emerged as a highly dedicated faculty who travel around the region to train and stimulate their peers. We have also hosted an AO day at the annual Malawi Orthopaedic Association meeting for the past five years. This is an educational day aimed at OCO’s, focused on improving conservative fracture care standards with practical training—particularly the application of monolateral external fixators, and setting up lower limb traction or applying good plaster casts. The SEC also funded Dr Linda Chokotho’s five year residency program: She graduated in December 2007 as the first female orthopedic graduate and the top student in the SEC 10-country region in Africa. Above all the AO is a source of encouragement to me, my surgical, ORP and OCO colleagues. Our patients have truly benefited from an improvement in trauma care.

SIGN facts

Surgical Implant Generation Network (SIGN)

SIGN is a nonprofit organization whose vision it is to create equality of fracture care throughout the world. SIGN has designed an intramedullary nail interlocking screw system which does not need real-time imaging to accomplish proximal or distal interlock. The same instruments and implants are used to fixate fractures of the tibia, femur and humerus. A system to treat stable and unstable intertrochanteric hip fractures without C-arm imaging has been designed and is being used successfully in seven beta sites. These systems have been donated to SIGN programs for treating the poor. 50,000 SIGN surgeries have been completed by 2000 surgeons in 46 developing countries. Each surgery is reported with pre-and postop x-rays on the SIGN online database and reviewed by North American surgeons which often results in educational dialogue between surgeons from the different regions. Such interchange of experiences also occurs during regional events and the annual SIGN conference. Participation by surgeons skilled in open and closed fracture treatment is welcomed. Detailed information about SIGN can be found at www.sign-post.org.
Surgical Implant Generation Network (SIGN)

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AO Dialogue-SIGN fellow, Edmund Elieza Ndalama, reports from the 2009 SIGN Conference

Surgeons from around the world gather annually to discuss difficult fracture treatment. Held in Richland, Washington, United States from August 12–15, the 2009 event was kicked off by an interactive workshop with surgeons from developing countries instructing other surgeons in the SIGN technique. From this it emerged that the early use of the SIGN nail in open fractures, when soft tissues are closable, has helped decrease the economic burden of multiple operative interventions for open fractures. The keynote address on the treatment of unstable pelvic fractures was given by Orthopaedic Trauma Association President David Templeman; special emphasis was put on the consequences of fractures from blast injuries, after earthquakes, and in conflict areas.

Nonunions and malunions

The conversion of failed plate fixation to the SIGN nail was shown to be most effective if intraoperative compression after distal interlocking was performed. An infection rate of approximately 5% is slightly higher than for closed primary fracture surgery. 250 patients with infected nonunions from Nepal, Bangladesh and Malawi, using the SIGN nail in a one-stage revision procedure, showed 85% union. The clamshell osteotomy and Ilizarov technique for diaphyseal malunion correction were also discussed.

Basic science

A wide variety of findings were discussed including that the bioactive membrane formed around methylmethacrylate appears osteogenic and may be used to help treat bone-loss nonunions. In contrast, the biofilm that forms around nonviable material and implants can harbor bacteria protecting them from antibiotics. The surgeon must be aware of the formation of both types of biofilm for optimum fracture treatment. Optimum drilling speed, pressure from the surgeon and pulsing the drill, make drilling much easier in the hard bone found in certain regions of the world. Drilling can be accomplished with commercial drills, using a drill cover and chuck extension to prevent infection. The problem with intramedullary fixation of proximal tibial fractures was correlated to the anatomical shape of the proximal tibia.

Soft tissue

Immediately before the conference, 26 SIGN surgeons participated in a flap workshop, organized by Randy Sherman, where different flap techniques and indications were explored by the attendees. Rotation flap technique, negative pressure wound therapy and the use of honey, [see pages 6–11], were discussed as methods to facilitate soft tissue healing.

Hip fractures

An in-depth study of hip fracture treatment problems in 2009 was reviewed. The initial results of the SIGN method for intertrochanteric fracture were delivered showing how to reduce and stabilize successfully without image intensification. A number of patients, using a new fixation device for hip arthrodesis, were also presented.

Techniques

The role of blocking screws for reduction in proximal and distal tibia fractures, as well as distal femur fractures, was examined. That the optimal entry point for the straight SIGN nail is at the tip of the trochanter between the posterior and middle third, was agreed, as was how to ensure placement of the distal interlocking screw. As to the number of interlocking screws required, no consensus was reached, and the feeling was that a study of this should be undertaken for the SIGN database.
“Surgeons and Trustees can make a difference.”

In an interview with AO Socio Economic Committee (AOSEC) Chairperson, and Africa representative, Paul J Demmer, AO Dialogue heard what a difference a year makes at SEC.

What have been some of the highlights in 2009 for SEC?
In Africa, we are active in ten countries and established in six countries. Of course there are far too many achievements to mention here, but within this group Malawi is a real success story, a model of the SEC goal to improve the care of the injured in developing countries through education courses and training. Similar activities happen all over the region but Malawi is unique in exemplifying the full spectrum of what SEC wants to achieve in terms of self-sufficiency and long-term sustainability, in one country. The ORP team of four, developed in the Beit Cure International Hospital (BCIH), is now organizing its own courses and the members are exporting their knowledge to neighboring countries. The SEC has also helped to train over 300 orthopedic clinical officers (OCO’s) who are the backbone of initial fracture care in Malawi. The training of the first female orthopedic surgeon in the BCIH was possible with SEC support and the second resident is well on his way. The Trauma Fellowship, hosted in Malawi, has helped SEC gain a foothold in the Ortho Teaching Unit in Addis Ababa, Ethiopia, where the qualified fellow is now organizing non-operative courses. And last but not least, an SEC sponsored prospective randomized research project on ORIF in HIV positive patients, with a 97% follow-up over five years is nearing completion.

Taking just one highlight from another region, Latin America, the fellowship program in Brazil is running well: To date 148 fellows have been hosted in Ribeirao Preto and 90 fellows in Sao Paolo and the plan is to continue extending the fellowship program.

No doubt there have been some disappointments along the way?
Despite all the achievements there are naturally ongoing issues SEC has been dealing with throughout the regions. In Oceania the unstable political situation in the countries SEC has focused on—Papua New Guinea, Fiji, Solomon Islands and East Timor—largely prevents teaching activities. Back in Africa four one-year trauma fellowships are given to applicants from Africa and supervised by the East-Central-Southern African Orthopaedic Association (ECSAOA). The selection, registration and duration of the fellowships have, over the last two years, become administratively very complex and are at present under review. Furthermore, the licentiate program in Zambia, to which the SEC has allocated money, has not got off the ground. The aim of this program is to train non-doctors to deal with trauma injuries in district hospitals outside main cities where there are no doctors present. The worldwide emphasis on addressing malaria, tuberculosis and HIV overshadows the fact that a trauma pandemic is crippling developing countries.

Malawian is unique in exemplifying the full spectrum of what SEC wants to achieve.
It’s crucial we clarify where SEC belongs within the new AO Foundation structure.

**What is the nature of the challenges SEC faces going forward?**

One of SEC’s primary concerns is funding. The 2010 budget has been fully allocated and there is no additional money for helping people run new courses or to take advantage of opportunities to extend existing ones.

From an administrative point of view it is crucial we clarify where SEC belongs within the new AOF structure: I propose that SEC should remain independent of the specialties while ensuring co-operation and no overlap, and report directly to the AOV.

There are a couple of succession issues to be sorted next year: Fernando de La Huerta, local project leader in Mexico, has retired, so his replacement needs to be found and the local fellowship program restarted. In 2010, I am retiring as both SEC chairman and Africa’s SEC representative, so these roles also need to be filled.

Although there are many demands on our time we must attempt to gain a foothold in African Francophone countries next year and work towards cooperation with Synthes to deliver complete hardware sets for training purposes.

**What can be done better in the future?**

In order to increase our impact we need to make the AO Network, and in particular the Trustees, more aware of our work: helping them to understand who they should approach when they have an idea or query. I think it is a wonderful idea to use AO Dialogue going forward as a means of communicating SEC’s achievements and issues to surgeons and Trustees who can make a difference. It is also up to us to find opportunities to better advertise the nonoperative SEC-run courses in developing countries. And finally we must find a way to get implants into hospitals where surgeons have the skills and training, through attending courses and fellowships, to fix fractures operatively, but don’t have the money to buy the basic sets.

**How does the work of SEC differ around the world?**

Differences in healthcare systems mean different requirements of the surgeons and ORP. Each country has different challenges associated with ensuring the appropriate training and teaching medical staff to work safely in their specific environment. In Brazil there are areas which have a very high concentration of surgeons and other areas with none. Similarly in India there are high concentrations of surgeons, often working privately, around the large cities and a complete lack of surgeons in the poorer regions such as the north east of the country. I could go on...

**How important is your involvement in the developing world?**

In these areas SEC is the visible arm of AO. In developing countries 70–80% of trauma patients are treated by licentiates, OCO’s and nurses rather than doctors; our primary fracture management training is critical to this working effectively. Surgeons who have studied in developed countries will not treat patients nonoperatively because they have not been trained to do so, however if there are no implants available in their hospital for them to treat operatively then the patient suffers and here our nonoperative courses can make all the difference.

**What difference can individuals in the AO Network make to SEC’s work?**

We want to ensure that Trustees are aware of where gaps are so they can see where they might be able to help themselves or recommend an appropriately skilled surgeon. Ideally SEC would like to build reverse fellowships where people with very specific skills come and spend time teaching local staff to implement rather than doing the work for them over a short intense period.

Many thanks to Paul J Demmer for taking the time to give us an update on recent SEC activities and we look forward to publishing further reports on SEC progress.
Angella N Mphande, Beit Cure International Hospital, Blantyre, Malawi, Africa, angellam@curehospital.mw

Introduction
Honey and sugar dressings have long been used for dressing of open wounds in Malawi. We undertook a comparative study looking at relative efficacies of honey and sugar dressings in our institution.1 Honey proved to be more effective than sugar in reducing bacterial contamination and promoting wound healing, and slightly less painful than sugar during dressing changes and motion. Ever since this was discovered, all open infected wounds in our institution are dressed with honey. This includes open fractures, wounds after sequestrectomy, open burn wounds, tropical ulcers, and animal bites (including crocodile bites!). The honey is purchased locally and we use a runny variety to facilitate ease of application. It is not necessary to sterilize honey prior to application, rather it is applied straight from the bottle to the wound.

Technique
The wound is cleaned using aseptic technique. After a wound is washed using a saline solution and sterile gauze, then runny honey is poured and evenly spread onto a dry sterile gauze. Finally the gauze is applied to the open wound, and covered with a crepe bandage. Dressings are changed every day given the honey has been proven to work best when regularly changed.2 Frequency of wound dressing may be reduced to alternate days as healing progresses.

References
Use of honey for wound healing

Is honey the ideal wound dressing? AO Dialogue-SIGN fellow, Edmund Ndalama Eliezer, and co-researchers, addressed this question in a study conducted in Tanzania.

Honey as a wound dressing is gaining popularity. Clinical reports show that: infection is rapidly cleared; inflammation, swelling and pain are quickly reduced; odour is reduced, necrotic tissue debridement is induced; granulation and epithelialization are hastened, leading to rapid healing with minimal scarring and tissue damage. Honey also has an inhibitory effect on approximately 60 bacterial species including aerobes, anaerobes, gram-positives, gram-negatives and Aspergillus and Penicillium as well as all the common dermatophytes. In addition, honey enhances wound healing by providing nutritional content such as fructose, which may promote epithelialization along with its hygroscopic effect which reduces tissue edema. Biochemically, honey is a simple sugar (40% glucose, 40% fructose and 20% water) containing amino acids, vitamins (bioten, nicotinic acid, folic acid, pantothenic acid, pyridoxine and thiamine). The vitamin C component in honey is of particular importance for its essential role in collagen synthesis. Along with glucose oxidase and catalase enzymes, honey contains minerals including iron, magnesium, phosphorus, copper and calcium. Honey is an ideal first-aid dressing material, especially for patients in remote locations where infection could set in before medical treatment is obtained. It is readily available and simple to use and acts as highly viscous barrier preventing bacterial penetration and colonization of the wound surface.

Main objective
To determine the effectiveness of honey as compared to povidine-iodine (PVP-I) in promoting/enhancing healing in posttraumatic, noninfected, open wounds by assessing the rate of granulation tissue formation, the antibacterial action of honey and the duration of hospitalization/dressing.

Materials and methods

Study design
Ethical clearance was obtained from the Muhimbili University of Health and Allied Sciences’ ethical committee. Over a nine month period during 2006 and 2007, all eligible patients admitted to Muhimbili Orthopaedic Institute (MOI) with posttraumatic, noninfected, open wounds were randomly assigned, using sealed envelopes, to either the honey dressing group or the PVP-I dressing group. Inclusion criteria:

- Extremity wound with no fracture ie, degloving injury, laceration or crushed injury.
- Patients with Gustillo and Anderson grade I, II, and III open fractures, not closed primarily.

The authors

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The AO Dialogue-SIGN Fellowship

The AO Foundation, through AO Dialogue, has cooperated with SIGN to provide a surgeon, from a developing nation, with funding to travel to the annual SIGN conference. This individual provides a conference report [see page 3] and their meeting presentation [see pages 7–11] for publishing through AO channels. The fellow is chosen by the SIGN Director, Dr Lou Zirkle and the Editor of AO Dialogue. The selection criteria are: SIGN involvement; patient and local community activity; and the scientific and clinical use of their submitted paper. This year, Edmund Elieza Ndalama from Dar es Salam, Tanzania was chosen as the AO Dialogue-SIGN fellow.
• Wounds left open after amputation, following trauma.

Exclusion criteria:
• Patients with Gustillo and Anderson grade I and II open fractures, closed primarily.
• Patients with other pre-existing diseases such as diabetes mellitus, vascular diseases, malignant conditions or other debilitating diseases.
• Patients with infected wounds, following trauma.

Sample size
It was estimated that: when topical honey dressing is applied, a good healing response is 84.4%; while a good healing response with PVP-I is 50%; and that the sample size should be 68.

Study area
The study was conducted at MOI, a major orthopedic and trauma centre catering to Dar es Salaam’s population of four million. It is also a referral centre for orthopedic and trauma patients from throughout Tanzania.

Application and treatment
Sixty eight randomized patients were treated according to the following protocol: after surgical debridement, all subsequent dressings were applied using either honey or PVP-I on the gauze; dressings were changed every 48 hrs; all patients were given a daily 1 gram dose of a third generation cephalosporin—ceftriaxone—administered intravenously, for a period of five days. In the study group, honey was applied to the gauze dressing while in the control group, PVP-I was implemented.

Observational parameters
Swabs were taken from the wounds for culture and sensitivity, immediately after surgical debridement and on day 3. Subsequent swabs were taken every two days until wounds became sterile. The formation of granulation tissue was also assessed every second day: A poor result was indicated by a pale, blue or patchy granulation bed while healthy tissue was red and beefy. The discharge and smell were also noted. The subject was followed up until the wound either healed by epithelialization or was ready for skin grafting or secondary closure.

Data analysis
Data was entered using Epi Info, version 6 and analyzed by Intercool STATA version 9. Data was summarized using frequency distribution and two way tables. Comparison of proportions between two treatment groups was done using the Fishers exact test. A P value of less than .05 was considered significant.
Results

A total of 68 people with posttraumatic, noninfected open wounds, who met inclusion criteria were recruited (Table 1).

The mean age in the honey group was 30.9 years, while in the PVP-I group the mean age was 33.83 years. A relatively higher proportion of patients, 57.3%, were in the 25–44 age group. Over 65’s accounted for only 4.4% (Table 2).

Wound causes

The etiology of the traumatic wounds are shown in Fig 1 while the anatomical locations are seen in Table 3.

The wound diagnosis is shown in Table 4 with the majority in both groups being Grade III open fractures.

Granulation tissue formation rate

The earliest healthy granulation tissue was observed in a patient being dressed with honey on day 7, while there were no patients with healthy granulation tissue in the control group at day 7. On day 9 there were three patients in the honey group who had healthy granulation tissue and still none in the control group. The difference, however, between the two groups was not statistically significant ($P > .05$). On days 11, 13, 15, and 17 of dressing, there was a higher proportion of patients whose wounds had healthy granulation tissue in the honey group compared with the PVP-I group. This difference was highly statistically significant ($P < .0001$). Furthermore, on day 19 and 21 there was a statistically significant difference in the proportion of patients with healthy granulation tissue in each group ($P < .05$). However, from day 23 there was no significant difference between the two groups ($P > .05$) (Table 5).

Bacteria clearance rate

Both groups where given prophylactic antibiotics. Day 1 cultures revealed bacteria growth in both treatment groups, though statistically less ($P < .05$) in the PVP-I group. On day 3 and 5, bacteria growth was not statistically significant between the two groups ($P > .05$). On days 7, 9 and 11 the honey group had a statistically significant lower growth rate of bacteria ($P = .0004$, $P < .0001$ and $P = .0005$ respectively) (Table 6).

<table>
<thead>
<tr>
<th>Day of dressing</th>
<th>Healthy granulation Tissue formation</th>
<th>Honey Dressing %</th>
<th>PVP-I Dressing %</th>
<th>$P$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 7</td>
<td>Yes</td>
<td>1 (2.9)</td>
<td>0 (0.0)</td>
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<tr>
<td></td>
<td>No</td>
<td>33 (97.1)</td>
<td>34 (100.0)</td>
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<td>25 (73.5)</td>
<td>3 (8.8)</td>
<td>$P &lt; .0001$</td>
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<td>31 (91.2)</td>
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<tr>
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<td>$P &lt; .0001$</td>
</tr>
<tr>
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<td>0 (0.0)</td>
<td>26 (76.5)</td>
<td></td>
</tr>
<tr>
<td>Day 17</td>
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<td>15 (44.1)</td>
<td>$P &lt; .0001$</td>
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</tr>
<tr>
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<td></td>
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<td>8 (23.5)</td>
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Table 5 Rate of healthy granulation tissue formation

<table>
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<tr>
<th>Day of dressing</th>
<th>Bacteria growth</th>
<th>Honey dressing(%)</th>
<th>PVP-I dressing(%)</th>
<th>$P$ value</th>
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</tr>
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<td>31 (91.2)</td>
<td>17 (50.0)</td>
<td></td>
</tr>
<tr>
<td>Day 9</td>
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<td>1 (2.9)</td>
<td>18 (52.9)</td>
<td>$P &lt; .0001$</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>33 (97.1)</td>
<td>16 (47.1)</td>
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<tr>
<td>Day 11</td>
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<td>13 (38.2)</td>
<td>$P = .0005$</td>
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<td>33 (97.1)</td>
<td>21 (61.8)</td>
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<td>$P = .355$</td>
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<tr>
<td>Day 17</td>
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<td>0 (0.0)</td>
<td>1 (2.9)</td>
<td>$P = 1.00$</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>34 (100.0)</td>
<td>33 (97.1)</td>
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Table 6 Rate of bacteria clearance
Bacteria isolated from honey dressings

*Staphylococcus aureus* and *Escherichia coli* were isolated from honey dressings: *Staphylococcus aureus* was the most prevalent. The frequency of *Staphylococcus aureus* positive cultures decreased from 12 patients (35.3%) on day 1 to 1 patient on day 9. *Escherichia coli* was seen in four patients on day 1 and from day 7 on there was no further growth (Fig 2).

**Discussion**

The worldwide prevalence of trauma is increasing, with a growing number of cases being reported in developing countries such as Tanzania. Likely causes of this include rapid and unplanned urbanization, the absence of adequate infrastructure, and weakness in the legal regulatory framework. This study was carried out as a response to the fact that trauma injuries are a growing surgical problem in most developing countries. The majority of these injuries result in open wounds. Management of posttraumatic, noninfected, open wounds still remains a matter of debate and an ideal wound dressing material following surgical debridement has yet to be discovered. An ideal, topically applied, wound dressing material should have the benefit of preventing or reducing infection rates and accelerating wound healing. To date many wound dressing agents have been utilised, including honey which for more than 100 years has been known to accelerate wound healing.

This study of 68 patients is consistent with the previously published etiologies, demographics and wound characteristics that other MOI studies have evidenced. Healthy granulation tissue was formed much earlier in the honey dressed group as compared to the control group. The earliest healthy granulation tissue was observed on day 7, and by day 15 all patients in the honey dressed group had healthy granulation tissue, while by day 15 only eight patients (23%) in the control group had healthy granulation tissue. This meant that the honey treated wounds were

Bacteria isolated from honey dressings

*Staphylococcus aureus* and *Escherichia coli* were isolated from honey dressings: *Staphylococcus aureus* was the most prevalent. The frequency of *Staphylococcus aureus* positive cultures decreased from 12 patients (35.3%) on day 1 to 1 patient on day 9. *Escherichia coli* was seen in four patients on day 1 and from day 7 on there was no further growth (Fig 2).

Bacteria isolated from PVP-I dressings

The isolated bacteria in PVP-I group were: *Staphylococcus aureus; Escherichia coli; Streptococcus pyogenes; Klebsiella spp*. On day 1, only *Staphylococcus aureus* was isolated. On day 3, there were growths of *Escherichia coli* and *Klebsiella spp*. On day 11 there were growths of *Streptococcus pyogenes* and from day 17 one patient had a *Streptococcus pyogenes* growth until day 29 (Fig 3).

Duration of dressing

All 68 wounds healed: In each group 29 (85.3%) wounds healed primarily, four (11.8%) wounds were grafted—two (5.9%) in each group respectively—while one (2.7%) PVP-I and three (8.8%) honey wounds were closed secondarily. The mean duration for wound healing in those dressed with Honey was 19 days with standard deviation ±4.15 while for the PVP-I group wound healing was 25 days with standard deviation of ±4.67. Of wounds dressed with honey, 21% healed within 15 days as compared with 0% in the PVP-I group. And within 25 days 97% of honey dressed wounds were healed while only 50% healed in the PVP-I group (Fig 4).
ready for skin grafting earlier than those of the control group. This was in line with what was observed by Bergman et al in a 1993 study of the acceleration of wound healing in animals by topical application of honey. Similar findings in a study conducted in Nigeria show healthy granulation tissue was observed earlier and wounds healed faster with honey than in control groups. This could be due to the action of honey in stimulating proliferation of peripheral B-lymphocytes and T-lymphocytes, and also by stimulation of monocytes which in turn activate the immune system by releasing cytokines. The nutrient content of honey and presence of vitamins, especially vitamin C, makes wounds heal faster.

This study found out that only two types of bacteria were isolated from honey dressed wounds i.e., *Staphylococcus aureus* and *Escherichia coli* while in PVP-I dressed wound the bacteria isolated also included *Streptococcus pyogenes* and *Klebsiella spp.* This may be due to antibacterial activities of honey (which are responsible for inhibiting bacterial growth), combined with honey’s high viscosity acting as a barrier, which prevents bacteria from penetrating the wound. The study also revealed that wounds dressed with honey became bacteriologically sterile within 5–10 days. Efem SE also observed that, in a study conducted at Kilimanjaro Christian Medical Centre, wounds became sterile within one week of topical honey dressing. Some authors (Allen KL et al) reported a difference in antibacterial activities of honey depending on its origin. This was not observed in this study: The honey used came from different parts of Tanzania and produced the same results.

During this study the length of time patients needed to attend clinic for dressing was much shorter in the honey dressed than in the control group. Similar results were observed in studies by Bergman et al, Vardi A et al and Efem SE.

The risk of wound infection with *Clostridium botulinum* after topical application of pure honey has been raised by some authors. This may be more theoretical than practical in so far as there are no reported cases of wound botulism as a result of honey application. During this study pure, unprocessed honey was used in all patients in the honey group, and no patient developed signs of botulism infection.

**Conclusion and recommendations**

**Conclusion**

This study demonstrates that raw honey is an effective open wound dressing agent by healing wounds faster and inhibiting bacterial growth.

**Recommendations**

- Raw honey can safely be used as dressing material in posttraumatic, noninfected, open wounds. In a situation which requires proper surgical debridement, honey should not be a substitute for, and should follow after this necessary procedure.
- Efforts should be made to categorize honey as a formal dressing agent in health institutions in other countries.
- More studies need to be conducted on the use of honey dressings, especially in diabetic, malignant and contaminated wound cases and in relation to eradicating MRSA-bacteria.

To see a list of references go to: [www.aofoundation.org/honeyref](http://www.aofoundation.org/honeyref)
With the approval of the new AO Foundation Charter and Bylaws during the June 2009 Board of Trustees Meeting, AOVET was officially recognised as the fourth AO Foundation Specialty, with a representative on the AOVA—Jean-Pierre Cabassu.

Jean-Pierre was born into a family of equine veterinarians; his grandfather’s practice in Marseille was inherited by Jean-Pierre’s father and uncle. Growing up surrounded by horses, no doubt influenced Jean-Pierre’s decision to keep the family vocation alive once he graduated from Ecole Nationale Veterinaire d’Alfort in Paris.

During Jean-Pierre’s veterinary training, his interest in AO was sparked by a group of Swiss veterinary surgeons applying new and efficient techniques in the treatment of fractures in horses. After graduation, he traveled mainly around France and the US, gaining experience at veterinary practices specializing in equine trauma care in order to improve his skills in musculoskeletal trauma care. In 1977 he entered the family practice, the same year he became a member of AOVET having completed the first Davos AOVET small animal course in French. At this time his surgical field of interest switched to small animals because of the limitations of the horse industry in the south of France.

After becoming involved with AO, he developed, together with good friends who were equally taken by the AO principles of fracture treatment, the annual French AOVET course held in Les Deux Alpes, France. This course is still, 22 years later, directed by Jean-Pierre and organized by the same team, testifying to the longevity of AO friendships. Over the years Jean-Pierre was an international instructor at AOVET courses around the world; from 1999 to 2002, he served as member of the Expert Group of AOVET (VEEG) and, finally in 2009, 30 years after his first AO course, he became Chairman of AOVET. Jean-Pierre’s mission now is to advance the AOVET membership program, growing AOVET into a strong specialty partner within the AO Foundation. Development of the new AOVET website in 2010, leading to a worldwide community of specialists devoted to the musculoskeletal system in animals, will be just one milestone towards this goal.

Jean Pierre is married to Beatrice and together they have three sons, one of whom is currently pursuing his residency in small animal surgery. And so the Cabassu’s family mantle is taken up by the next generation...

Jean-Pierre’s mission is growing AOVET into a strong specialty partner within the AO.
Björn von Salis, Feri and Geri Kasa, Orthrun Pohler, Jörg Auer

On August 21 2009, August Guggenbühl (Guggi to his friends), the last AO co-founder, died, aged 91, in the presence of his wife Rosemarie, at home in Lenzburg.

In the early 1960’s Guggi was asked by his mentor Hans Willenegger, to teach interested vets how to “plate and screw up” animal bones according to AO techniques. He took this task very seriously, with the conviction that AO techniques would help animal fractures heal, despite the fact that animals had to load their treated limb immediately after surgery. Although we are still not at the point at which all animal fractures can be successfully treated, a tremendous amount of progress has been made in the past 40 years and so Guggi achieved his ultimate goal.

As a passionate dog-lover—in the 1970’s he kept several large dogs, Irish Wolfhounds, Great Danes, Mastiffs and Greyhounds among them—Guggi related very well to vets. In his house the comfortable sofas in the large living room were spoken for by his canine friends (guests had to make do with the hard chairs) and appetizer plates were often mysteriously empty by the time guests arrived, facts Guggi acknowledged with a mischievous grin.

Guggi accompanied the “Waldenburg Group”, consisting of, among others, Feri and Geri Kasa, and Björn von Salis, to numerous meetings and continuing education events for vets, both in Switzerland and abroad. He intervened during discussions relating to fracture management and bone healing with well founded arguments. In order to better communicate with English-speaking vets, he even learned the language as a seasoned surgeon. His help was also invaluable to the “Waldenburg Group” during regular Wednesday evenings meetings where new clinical cases were explored and he helped them to prepare lectures and publications on fracture management techniques. Another of the many highlights of Guggi’s work with vets was when during the annual AOVET courses after teaching a full day, Guggi got together with interested vets to continue case discussions until the small hours, normally ending with a nightcap.

Initially Guggi well not versed in equine care (although he came to love horses over time) and underestimated the challenges they had to overcome during treatment with their natural fight-or-flight instinct and substantial weight. Early failures were a great disappointment to him and he had difficulty accepting that if a fracture fixation failed, horses had, in most instances, to be destroyed. This experience made him ever more determined to find a way to fix these animal fractures.

Guggi was a shining star for us vets, a role model of a medical specialist who did not compromise, never spoke negatively about a colleague, fulfilled his assignments dutifully, and came wherever and whenever his vet friends needed him.

Guggi, you were a true friend, you showed us the way and, thanks to your efforts, we can now treat animals very effectively.

August Guggenbühl—
a role model of a medical specialist who did not compromise

The last word...
From the AO Service Units

AO Clinical Investigation & Documentation (AOCID)

Recent AOCID Highlights
The annual AOCID survey will take place during the AO Davos Courses in December. The focus of this year’s study is the pinch and grip strength of surgeons. The results will be compared with an existing dataset of non-surgeons from a prior survey. The local Alpine sport of “Nagle” (involves hammering a nail into a tree stump at speed) will form part of the attraction at the booth. AOCID is looking forward to welcoming as many participants as possible to its stand on the lower floor in the Congress Center.

The results of last year’s study on the health status, health behavior, and quality of life of orthopedic and trauma surgeons were presented at the DKOU congress held in Berlin in October 2009. Almost 600 surgeons took part in this interesting investigation into a neglected element of medical professionals’ lives. A publication based on the study is completed and will be available early next year.

Also at the DKOU congress, Beate Hanson, Director of AOCID, was one of the co-presenters of the AO Lunch Symposium entitled Proof of Evidence in Innovations: Engine or Brake? (Evidenznachweis bei Innovationen: Motor oder Bremse?). Pro and contra evidence for five medical devices were presented to the audience and the event was a resounding success.

Joost van Middendorp, the current AOCID Fellow, was the recipient of the Dutch Spine Society’s Award in November. His winning paper was voted the best Dutch publication in spine literature in 2009. Joost traveled to Nijmegen in the Netherlands to take part in the society’s annual meeting and to receive his award in person. Congratulations Joost!

AO Research Institute Davos (ARI)

European Conference on Biomaterials (ESB) 2009
The congress, organized on behalf of the Swiss Society for Biomaterials by SSB president and ARI Director, Geoff Richards along with Marc Bohner of RMS Foundation and Christine Wandrey of EPF Lausanne, took place at the Beauilieu Convention Centre in Lausanne, Switzerland from September 7–11. The AO had a strong presence at the congress in the form of sponsorship and organization of the “theme of the day” for the Infection day, organization of a scientific session dedicated to the memory of Berton Rahn (former head of Histology at ARI), and presentation of some of the services offered by the AO Foundation at the dedicated ARI exhibition space. The featured services, Global Clinical Trials Management AG PreClinical Division and the ARI RISystem, were previewed with the intention of raising awareness among the ESB community. The success of this undertaking by both groups was demonstrated by the number of new contacts established and quotations requested.

AO COIAC (Comprehensive Injury Automatic Classifier) at the Orthopaedic Trauma Association (OTA)
At the last annual meeting in San Diego, the AO Foundation presented the AO COIAC, a PC-based software developed at AOCID to help surgeons to learn and use AO classification systems for clinical diagnosis and simple local case documentation. The current version includes the AO/OTA long bone fracture classification system for adults, the AO pediatric long bone classification system, as well as a newly developed AO craniomaxillofacial system for injury location.

Laurent Audigé, the AO COIAC project leader and a member of the AO Classification Task Force, received a lot of positive and valuable feedback from surgeons. More than 3,000 downloads have been registered in 2009 already, demonstrating the worldwide interest in such a software solution.

For more information and to download, please visit www.aofoundation.org/aocoiac.
AO Technical Commission (AOTK)

4th Experts’ Symposium on Intramedullary Nailing
On September 25–26, 2009, the fourth clinical exchange meeting on intramedullary (IM) nailing took place in Innsbruck, Austria. 55 surgeons from 17 different countries discussed their experience with IM nailing. The symposium was chaired by Tim Pohlemann, Dankward Höntzsch, Pol Maria Rommens, and Michael Blauth whose clinic hosted the symposium. As usual in the Experts’ Symposia, the focus was on difficult cases and cases with problems. Faculty and participants presented their own cases and discussed treatment alternatives using the Anonymous Response System. The Angular Stable Locking System (ASLS) for IM nails, a bioresorbable sleeve which minimizes toggling, is expected to reduce pain and allow earlier weight bearing, even in nonunions and it can be used for all nails. As an optional device, its usage can be decided intraoperatively. ASLS is advantageous for very proximal fractures which have a higher risk of secondary dislocation, and distal fractures, also in osteoporotic bone. Therefore, it will expand nailing indications.

It became quite clear that the recent innovations in nails and the angular stable plates have changed the range of indications when either a nail or a plate may be used safely. These overlapping indications will be discussed at next year’s meeting on October 1–2, 2010 in Mainz, Germany.

TK News 2009
The current issue features 39 new products, 21 cases, two clinical and one biomechanical study related to the introduced devices. The lead article deals with the shoulder prosthesis EPOCA. The Rib Fixation System developed by cardiothoracic and plastic surgeons stresses the relevance of cooperation in-between specialties. One article reveals tips and tricks for the removal of implants. Overall, 36 authors contributed. An electronic version can be downloaded from the AO website under “AO Publications / TK News”. All products described in the past 14 issues can be found under “Innovations” with sections on anatomical regions, subdivided into plates, nails, ExFix, screws, and instruments.
AO Education (AOE)

Just released: Two new handbooks from AOTrauma

“Orthopaedic Trauma Care” by Piet de Boer, Steven J Morgan, Christian van der Werken
This handbook offers a thorough overview, explaining the fundamentals of orthopaedic trauma care such as wound and fracture healing, injuries, compartment syndrome, etc. This handbook is comprehensive in scope and topics. It offers clear definitions, practical notes with background information, and hands-on instructions for patient treatment. A quick reference book for resident surgeons at all levels.

“Statistics and Data Management—A Practical Guide for Orthopaedic Surgeons” by Dirk Stengel, Mohit Bhandari, Beate Hanson
Applying new technologies, presenting your experience, and, thinking of your current practice in the light of new evidence, needs some understanding of clinical research methodology. This book will help you to sort and focus your ideas when setting up a clinical study, and to understand why certain information should be expressed in this or that fashion, how data should be compiled, analyzed, and presented.

For more information and to order, please visit www.aopublishing.com

Regional highlights

AO Asia Pacific (AOAP)
3rd AO Experts’ Seminar The event, which took place in Singapore July 11, 2009, was jointly organized by the TK-System and AOAP, and chaired by G On Tong, Merng Koon Wong, Tadashi Tanaka, and Norbert Haas. A record 110 surgeons from 13 different countries exchanged their clinical experiences in the upper extremity gained using the Locking Compression Plate systems and Expert Intramedullary Nail Family. These Experts’ events provide a forum to analyse problem fractures, while the limitations of existing techniques are discussed following the case presentations of the participants. Some problems are due to implants and some due to the surgeon. Only by open discussion of mistakes, can failure rates be decreased in the future.

AO Latin America (AOLAT)
New Regional Chairperson During the AO Trustees Meeting 2009 in Chicago, the AOLAT Executive Board and the Latin America Trustees Council confirmed Dr Marcelo Fernando Figari, head and neck surgeon, from Buenos Aires, Argentina as the new AOLAT Regional Chairperson. He succeeds Dr Carlos Sancineto, consolidating the Latin America Trustees decision to alternate specialties in the Regional management team. AOLAT is deeply grateful to Dr Carlos Sancineto for his excellent leadership from 2007–2009.

AO North America (AONA)
AO Foundation and AO North America join forces at OTA Annual Meeting Launched in the AO’s Jubilee Year 2008, AONA and the AO Foundation presented themselves once again with a joint booth in a prominent position within the exhibitors’ area at the 25th Annual Meeting of the Orthopaedic Trauma Association in San Diego. Visitors were invited to learn more about AONA’s educational and research opportunities and got an insight into the upcoming 2010 cross-discipline event “The Power of Synergy—Working Together for a Stronger Tomorrow” which is focused on challenges in fracture care. This meeting is uniquely designed to bring together surgeons in Orthopedic Trauma, Cranio-maxillofacial, and Veterinary medicine to discuss challenges in musculoskeletal fracture management. Open to surgeons across these three disciplines, as well as fellows and residents, this meeting is the perfect opportunity to showcase the latest ideas and innovations.