Aim: This study’s primary aim was to determine whether vascular status influences the outcome of patients treated with a minor amputation for their diabetic foot osteomyelitis. The secondary aim studied the impact of patient demographics and diabetic comorbidities on the same outcome.

Method: A retrospective analysis of all diabetic foot osteomyelitis patients admitted in 2015 treated with minor amputation. A total of 61 patients were followed up and 26 (43%) had a positive outcome. The clinical diagnosis of osteomyelitis was based on radiographic evidence and/or bone culture results. Data collection from patients’ records allowed the following variables to be studied: patient demographics (age, gender, ethnicity), diabetic comorbidities (smoking status, glycaemic control, obesity, previous foot amputation, CKD stage) and diabetic vascular disease status (microvascular and macrovascular disease, hypertension, limb revascularisation). The follow-up period for outcome was 12 months from the date of minor amputation, with the outcome measure defined as ‘positive’ if there was complete healing of the surgical wound and/or ulcer, or ‘negative’ if the patient was admitted for further medical/surgical intervention, if reinfection occurred or if the patient died.

Results/Discussion: Revascularisation was necessary in 30% of patients alongside the minor amputation, and was associated with a nonsignificant increased risk of negative outcome. Univariate analysis revealed chronic kidney disease stage as having an influence on the outcome ($p=0.005$). The independent risk factor predictive of a negative outcome following multivariate analysis was presence of coronary artery disease ($OR = 9.69$, 95% CI 1.07-87.47, $P$ value = 0.043). Presence of any macrovascular disease and HbA1c level were trending towards statistical significance. The remaining patient characteristics including demographics, comorbidities and microvascular disease status had no effect on the outcome.

Conclusion: This study’s findings conclude that the success of minor amputation as primary treatment is independent of patient characteristics. Presence of coronary artery disease was the only vascular factor predisposing a diabetic osteomyelitis patient to a poor prognosis following minor amputation. By evaluating patients for its presence prior to surgical intervention, patients at risk of requiring further intervention can be recognised and appropriate tailored treatment decisions can be made by the MDFT.
INVESTIGATION INTO THE RELATIONSHIP BETWEEN PLANTAR PRESSURE AND SKIN HARDNESS IN PEOPLE WITH DIABETES

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³India Diabetes Research Foundation, Chennai, India

Aim: Changes in the mechanical properties of plantar soft tissue could affect the tissues’ ability to uniformly distribute plantar loads and therefore increase ulceration risk in people with diabetic foot disease. Despite evidence that plantar soft tissue mechanical properties change during the course of diabetes the exact implications of these changes on the tissues’ mechanical viability is not yet fully understood.

Therefore, this study is to investigate if there is a relationship between plantar pressure and plantar skin hardness.

Method: Plantar pressure, Vibration Perception Threshold (VPT) and skin hardness were recorded from 40 (M/F 23/17) participants with diabetes age 63 ±8.61 years from two diabetic foot clinics in Chennai, India.

Plantar pressure distribution was recorded using two-step protocol and a 0.5mx0.5m pressure mat*. Three individual foot strikes were recorded for each foot and individual templates applied to divide the foot into regions (Hallux, 1st, 3rd, 5th Metatarsal heads, Midfoot and Heel).

Peripheral Neuropathy score and skin hardness was measured at these regions using a handheld instrument designed to measure the threshold of appreciation of vibration in human subjects** and a Shore-00 durometer, respectively. Spearman’s correlation test was used for both left and right feet separately to investigate the association between skin hardness, peak pressure, maximum and mean contact area, maximum and mean force and neuropathy.

Results/Discussion: Skin hardness was positively correlated to peak pressure in the region of 1st metatarsal head ($r=0.374$, $n=40$, $p=0.018$) and negatively correlated to peak pressure in the region of Hallux ($r=-0.316$, $n=40$, $p=0.047$). Skin hardness was positively correlated to maximum ($r=0.355$, $n=40$, $p=0.025$) and mean ($r=0.315$, $n=40$, $p=0.048$) contact area and maximum ($r=0.371$, $n=40$, $p=0.0018$) and mean ($r=0.416$, $n=40$, $p=0.008$) force in the 3rd metatarsal head region. On the other hand, skin hardness was negatively correlated to maximum ($r=-0.363$, $n=40$, $p=0.021$) and mean ($r=-0.357$, $n=40$, $p=0.024$) contact area in the 5th Metatarsal head region and mean force in the heel region ($r=-0.337$, $n=40$, $p=0.033$)

Conclusion: The results of the correlation test have revealed a significant yet weak association between plantar skin hardness and peak plantar loading. Further investigations are needed to understand if altered skin hardness is also associated with increased ulceration risk.

*MatScan, Tekscan
** Biothesiometer
[P3] SMART SOCKS MONITORING SKIN TEMPERATURE CAN PREDICT PLANTAR PRESSURE CHANGES

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²Ready Made Garments Department, Faculty of Applied Arts, Damietta University, Egypt
³Textile Department, Faculty of Applied Arts, Damietta University, Egypt
⁴Diabetes and Endocrinology Unit, Mansoura University, Mansoura, Egypt

Aim: To test the ability of smart socks measuring temperature changes beneath the plantar aspect of the foot to predict plantar pressure changes.

Method: The study included 25 healthy volunteers (11 males and 14 females, the mean age 41.1±17.6 years, BMI 29.4±6.95). The study was explained and written consent was taken. Smart socks had been designed, the socks were made of 62% cotton and 38% Acrylic. The thickness of the sock was 5.4 mm. 7 thermal sensors* ([negative temperature coefficient sensor]) were woven into the fabric of the sock at specific foot regions. The sensors are connected to a central unit made of an electronic circuit** through which changes in the sensor resistance is converted into temperature changes. Plantar pressure was measured by a pressure mat***. Automated masking divided the foot into 12 anatomically referenced regions: medial heel (MH), lateral heel (LH), mid-foot (MF), five metatarsal head regions (MTH1–5) and four toe regions (T1–4).

Results/Discussion: Pressure time integrals (PTI) were MH: 74.5±26.2, LH: 75.6±30.3, MF: 47.1±17.8, MTH 1: 62.3±25.2, MTH 2: 63.5±25.5, MTH 3: 69.7±34.5, MTH 4: 57.5±28.7, MTH 5: 57.2±24.2, T1: 50.5±25.7, T2: 43.9±18.3, T3: 45.8±24.9, T4,5: 44.9±34.2 KPa/sec. Temperature changes at sensor 5 significantly correlated with PTI at MTH2 (r 0.519, P 0.008), MTH3 (r 0.435, P 0.03), MTH4 (r 0.452, P 0.023). Temperature changes at sensor 6 significantly correlated with PTI at MTH1 (r 0.560, P 0.004). Temperature changes at S6 were significantly correlated with temp changes at S1 (r 0.524, P 0.007), S2 (r 0.704, P 0.000), S3 (r 0.487, P 0.013), S4 (r 0.515, P 0.008), S5 (r 0.601, P 0.001) and S7 (r 0.619, P 0.001). Temperature changes at sensor 5 significantly correlated with BMI (r 0.427, P 0.033).

Conclusion: Smart socks monitoring skin temperature can predict plantar pressure changes. Only two sensors at positons 5 and 6 could be sufficient to predict plantar pressure changes. We recommend the use of new technologies especially if cheap to increase patient awareness and consequently early detection of any foot pathology.

*Thermistor 10K NTC
**Arduino Mega
***MatScan (Tekscan Inc.)
Aim: To evaluate the effect of shoe outsole stiffness as part of diabetic footwear design on dynamic forefoot plantar pressures and patient satisfaction in diabetic patients at high risk of foot ulceration.

Method: Twenty-four diabetic patients (16 male, mean age 67 years) with neuropathy and high ulcer risk were tested in an extra-depth diabetes shoe with a tough 1.8cm thick rubber outsole with 18 degrees rocker configuration (tough outsole) or the same diabetes shoe with a 3mm carbon full shoe length reinforcement of the outsole (stiff outsole). The same custom-made insole was worn in both shoes. Shoe conditions were tested in randomized order. In-shoe pressures were measured during walking at a comfortable speed, standardized between conditions. Patient satisfaction was assessed using a Visual Analogue Scale (score 0-10).

Results/Discussion: Significantly lower metatarsal head peak pressures were found with the stiff outsole compared to the tough outsole (mean±SD: MTH1 146±52 vs. 163±59, MTH2-3 158±44 vs. 180±4, MTH4-5 107±36 vs. 117±38, p<.001). In >83% of cases with the stiff outsole and in >71% with the tough outsole, metatarsal head pressures were <200 kPa, an indicative level for protection against foot ulceration. No significant effect of outsole stiffness was found in the hallux region (164±37 vs. 171±48, p=.141). Patient satisfaction showed slightly better but non-significant (0.069<p<0.871) satisfaction scores for the tough compared to the stiff outsole on walking comfort (mean score 5.9 vs. 5.8), shoe fit (mean score 6.1 vs. 5.7), shoe weight (mean score 7.8 vs. 7.3), and shoe appearance (mean score 5.1 vs. 4.7).

Conclusion: A 3mm carbon reinforcement creating a stiff outsole led to significantly lower peak pressures at the metatarsal heads than a tough outsole, but appears to have no effect on hallux peak pressure or patient satisfaction outcomes relevant for high-risk diabetic patients. Based on these results, a carbon reinforced outsole is recommended to relieve forefoot peak pressures in high risk patients. Further investigation into the effect of a range of outsole stiffnesses on plantar peak pressures and walking comfort is needed to assist in defining the most optimal outsole stiffness for shoes for high-risk diabetic patients.
[PS] EFFICACY OF A PRO-ACTIVE SCREENING FOR DIABETIC FOOT ULCERATION IN THE COMMUNITY AUTONOMOUSLY PERFORMED BY NURSES

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Aim: the late diagnosis and referral of Diabetic Foot Ulceration (DFU) to specialist care is one of the most important determinant for the progression of the disease towards late stages and amputation. We tested the efficacy of a pro-active screening strategy in a community setting autonomously managed by nurses in detecting patient at high risk of DFU.

Method: in a community in north-west Tuscany, where 421,382 people live in a mixed urban/rural area, we trained 16 nurses according to the International Working Group on Diabetic Foot (IWGDF) guidelines for the screening of DFU. The nurses were committed to screen yearly DFU in the population of known diabetic patients, which were referred to them by their GPs. Patients at high risk or with active DFU, when detected, were promptly referred to a specialized DF clinic; all patients screened received education on how to prevent DFU. The results of the screening were retrospectively collected and analyzed for the years 2014-2016. Results are reported in the Table.

Results:

<table>
<thead>
<tr>
<th>Year</th>
<th>N. Diabetic Patients (%)</th>
<th>N. Screening (%)</th>
<th>N. High Risk (%)</th>
<th>N. DFU (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>6767 (1.6%)</td>
<td>2442 (36.1%)</td>
<td>21 (0.8%)</td>
<td>5 (0.2%)</td>
</tr>
<tr>
<td>2015</td>
<td>7016 (1.7%)</td>
<td>3856 (54.9%)</td>
<td>52 (1.3%)</td>
<td>8 (0.3%)</td>
</tr>
<tr>
<td>2016</td>
<td>9435 (2.2%)</td>
<td>6817 (72.2%)</td>
<td>144 (2.1%)</td>
<td>31 (0.5%)</td>
</tr>
</tbody>
</table>

Conclusion: Our data, although possibly biased by an underestimation of the actual prevalence of diabetes in the population, show how increasing the rate of subject actively screened in the population of known diabetic patients, the rates of high risk patients detected increases in parallel, as well as the rate of active DFUs, making it possible to early detect them and to intervene promptly, interrupting the progression of the disease.
Aim: Percentage area reduction by 4 weeks can be used to assess the likelihood of an ulcer eventually healing with standard clinical care. Using a 3D wound imaging system to assess ulcer area the aim was to determine if it is possible predict ulcer eventual healing from reduction in ulcer area over an earlier time period.

Method: We conducted retrospective analysis of consecutive new patients attending the diabetic foot clinic. Ulcer areas were assessed at two weekly intervals, with comparison of percentage area reduction from baseline. The healing rates of ulcers which eventually closed were then compared with ulcers which did not heal. Fisher’s Exact Test was used to determine which percentage reduction and at which time point was the most predictive of eventual ulcer healing.

Results/Discussion: Over a one year period, 149 new patients (February 2015 to February 2016) were studied. Mean age was 65±13 years, (Mean± SD); 74% were male and 86% had type 2 diabetes. Healing was achieved by 12 weeks in 44% of patients. At 2 weeks follow-up, after initial presentation, the average area reduction of patients who went on to heal was 48±42%, (Median 61%) vs 19±39%, (Median 21%) in the patients who did not heal. On further analysis, 60% area reduction at 2 weeks was a significant predictor of subsequent healing. (Fisher’s Exact Test, p=0.0409), whereas the use of 50% or less reduction of area at two weeks was not a significant predictor of healing. (p=0.1693). At 4 weeks follow-up, those that eventually healed had an average area reduction of 22±66%, (Median 34%) vs 16±65%, (Median 24%) in the non-healers. On further evaluation, 35% area reduction at 4 weeks was not a significant predictor of subsequent healing. (Fisher’s Exact Test, p=1.000). At 6 weeks follow-up, there was no statistical difference in the percentage area of reduction between the healers and non-healers.

Conclusion: The use of 60% or greater percentage reduction in ulcer area at two weeks is a robust predictor of eventual ulcer healing by 12 weeks
Aim: Fractures present with bone marrow edema (BME) on magnetic resonance imaging (MRI). BME in initial stage may represent inflammation or reparative fibrovascular tissue (callus formation). Spongiosa microfractures (i.e. active Charcot foot Grade 0) heal directly or by secondary fracture healing with callus formation, whereas corticalis macrofractures (i.e. active Charcot foot Grade 1) heal almost always with callus formation, when treated conservatively with immobilisation and weight bearing. Data regarding BME follow-up patterns in patients have not yet been published.

Method: We retrospectively analyzed data from 27 patients undergoing 27 baseline and 54 follow up-MRIs for qualitative BME increase (+) or decrease (-) during the healing process. Inclusion criterion was clinical improvement under standard treatment with walking casts.

Results/Discussion: In 14 Grade 0 cases, baseline MRIs after a median time of 4 weeks (range 1-52) after trauma as well as 23 follow-up MRIs were analyzed. Thirteen Grade 1 cases, were evaluated with baseline MRIs 12 weeks after trauma (range 4-36) and 31 follow-up MRIs. In the first 16 weeks after treatment initiation, a transient BME increase was found in 4/11 and 5/13 of the follow-up MRIs in patients with Grade 0 or 1 respectively. Clinical improvement with decrease of local swelling and hyperthermia was also observed.

<table>
<thead>
<tr>
<th>Weeks after baseline MRI (Begin of treatment)</th>
<th>0-8</th>
<th>8-16</th>
<th>16-24</th>
<th>&gt;24</th>
</tr>
</thead>
<tbody>
<tr>
<td>(n=27)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Follow-up MRI (n)</td>
<td>6</td>
<td>18</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>BME +/- (n)</td>
<td>4/2</td>
<td>5/13</td>
<td>1/11</td>
<td>0/18</td>
</tr>
</tbody>
</table>

Conclusion: In the long run, BME decreased in all cases. However, in the first 16 weeks after treatment initiation, a transient BME increase was observed in approximately 37% of the follow-up MRIs. This finding could indicate a prolonged physiological callus formation.
Aim: The reconstruction of diabetic foot ulcer (DFU) has been quite challenging. Especially, because majority of DFU patients have occlusive peripheral arterial disease, many microsurgeons hesitate performing the free flap for DFU reconstruction. Nowadays, the application of free flap for DFU is increased and high success rate as much as in non-diabetes has been reported, however, it has not been universal. We would like to report our results and discuss the role and worth of the free flap in the DFU reconstruction.

Method: From September 2010 to October 2016, 167 free flap operations were performed for 159 patients. All ulcers were bigger than 5x5 cm in area and invaded into bony level through fascia and tendon. The preoperative PTA was done if indicated and every patient were fully evaluated for medical and anesthesiologic problem.

Results/Discussion: Preoperative PTA procedures were done in 114 patients (68%). 139 flaps of 167 flaps showed complete flap survival (82%) and 10 flaps were partially necrotized. Overall flap survival rate was 89%. Among 18 total flap necrosis, 10 flaps were replaced with skin graft, four were healed with dressing, and four were treated with below knee amputation. There were 18 patients with renal failure, however 16 flaps were survived completely. The patients with flap survival could walk and there was no recurrence.

Conclusion: Currently, the success rate of free flap is mentioned as more than 95%. Similar rate could not be expected in DFU, however, our results showed that the success rate is not too low to look away free flap in DFU. Because most of DFU occur on the plantar where has a role for weight bearing, free flap is more superior to other reconstruction method like skin graft. According to my results and experiences, I would like to highly recommend free flap for DFU reconstruction.
Aim: To show the different performances of the diabetics patients during follow-up according to the presence of severe peripheral arterial disease (PAD) and revascularization.

Method: Between November 2009 and September 2012, 288 consecutive diabetic patients with foot ulcer were enrolled. Patients were treated according to multidisciplinary care protocol based on international guidelines. Patients were divided into three groups according to the presence of ischemia: Group A (non-ischemic); B (ischemic without revascularization) and C (ischemic with revascularization). Comorbidities, type of revascularization, ulcer healing rate, re-ulceration rate during follow-up, limb salvage, and survival were evaluated. Statistical analysis: Chi-squared test for categorical variables adjusted by the Bonferroni method. ANOVA for continuous variables adjusted by the Bonferroni method or Kruskal-Wallis test. SPSS V.22 for Windows was used.

Results/Discussion: 559 limbs (288 patients) were included. 172 limbs (31%) were classified as non-ischemic limbs (Group A), 290(52%) ischemic limbs (Group B) and 97 (17%) revascularized limbs (Group C) . Hypertension, previous cardiovascular events, retinopathy and sedentarism were lower in the non-isquemic group. Non ischemic patient were also younger, with shorter exposure time to diabetes and higher level of educational attainment. During follow up the healing rate is nearly 80% for the non-ischemic group (A) and nearly 60% for the ischemic limbs (B and C groups)(p <0.01). 18 patients (6%) needed a major amputation. The re-ulceration rate in groups A and B were 27% and 26.6% respectively, being significantly higher in group C (37.6% p<0.001). The overall death rate was 5.9% (17). The cumulative healing rate at 6 months were 60% for group A and 40% for groups B and C. After two-year follow-up, the healing rate for all lesions were 85%, 65% and 72% for the A, B and C groups respectively.

Conclusion: Ischemia is a negative prognostic factor in the diabetic foot, it is associated with lower healing rate and higher re-ulceration and amputation rates. A more aggressive policy of revascularization could improve the healing rate in those complex patients.
Aim: Autologous cell therapy has emerged as a perspective treatment of no-option critical limb ischemia (NOCLI) in diabetic patients. The aim of our study was to assess three different cell therapy product (CTP) isolation methods, quantify cell populations involved and correlate their numbers with transcutaneous oxygen pressure (TcPO2).

Method: Since the cell therapy program was launched in our podiatric clinic in 2008 90 applications have been executed. Autologous CTPs were separated either from peripheral blood (n=11) after precedent stimulation by granulocyte colony-stimulating factor or harvested from bone marrow processed by a Multicellular Processing System*(n=50) alternatively sedimentated using succinate gelatin (Plasma Volume Replacement**; n=29). CTPs obtained by these three isolation methods were analyzed to quantify CD34+cells, white blood cells (WBC), neutrophils, lymphocytes, monocytes and platelets. Subsequently cell yields in each population were statistically correlated with TcPO2 before and in regular intervals up to one year after cell therapy administration.

Results/Discussion: All three isolation methods resulted in significant increase in TcPO2 after 1, 3, 6 and 12 months in comparison with baseline values (p < 0.01); however there was no significant difference among these groups. Surprisingly whereas increase in TcPO2 did not correlate with amount of injected CD34+, there was a significant correlation of TcPO2 one month after cell therapy administration with WBC (r = 0.29, p = 0.0034), monocytes (r = 0.27, p < 0.001) and neutrophils (r = 0.32, p = 0.073) injected. Despite each isolation method generated different volumes of CTP, there was no significant difference in overall amount of CD34+ administered. We observed significantly higher WBC gains in CTP separated from stimulated peripheral blood (125.6 ± 70.5 x 10^9/l) compared to bone marrow harvesting by the use of the Plasma Volume Replacement** (50.6 ± 40.7 x 10^9/l, p = 0.013) and the Multicellular Processing System* (54.5 ± 23.9 x 10^9/l, p = 0.016).

Conclusion: Our study showed that cell therapy of diabetic patients with NOCLI resulted in significant increase in TcPO2 irrespective of isolation method. TcPO2 increase one month after cell therapy administration significantly correlated with the number of WBC, monocytes and neutrophils in contrast to no association with CD34+.

*Smart PReP2 (Harvest Technologies Corporation)
**Gelofusine
Aim: The aim of this review is to establish the effectiveness and cost effectiveness of orthotic interventions in diabetes.

Method: 14 databases were searched using MeSH headings and free text terms for to capture all research in the area. The search was limited to the last 20 years. Two reviewers independently screened the titles and abstracts of these studies for full text review. The extracted characteristics from each study included the type of orthotic intervention, the comparator/s and the outcome measures used. Extracted data were used to calculate effect sizes and odds ratios, where possible, for outcome measures of each study separately.

Results/Discussion: 15 Randomised Controlled Trials (RCTs) were identified which examined the effect of orthotics (foot orthoses and/or footwear) on the prevention or treatment of diabetic foot ulcers. None of these 15 studies examined the cost effectiveness of the interventions. Four studies compared ulcer incidence or relapse in a control group to a group provided with footwear and/or insoles or digital padding. Seven studies compared the effect of different orthotic interventions (footwear, foot orthotics, removable cast walkers, and half shoes) on prevention or treatment of ulceration and four studies compared an orthotic intervention to a total contact cast for ulcer healing. Reported outcome measures included ulcer incidence/relapse, ulcer free time, ulcer area, Bristol foot score, Foot Health Status Questionnaire, SF-36 and plantar pressure measurement. Results from three of the four studies which compared an orthotic intervention to a control group supported the use of an orthotic intervention.

Conclusion: Research in this area is limited with only 15 randomised controlled trials completed in the last 20 years and none of these studies examined cost effectiveness. In relation to ulcer healing, total contact casts are considered the gold standard, in terms of orthotic interventions removable cast walkers are more effective than half shoes or custom footwear. Research to date has identified orthotic interventions which are found to be effective in ulcer prevention and treatment. However, there are some conflicting findings in the research and further large scale RCTs are required.
Aim: Plantar foot ulceration and gait abnormality are two serious complications of diabetes. While rocker outsoles are the most common shoe modification for offloading diabetic foot, there is a paucity of research about their most effective design. Thus, we aimed to investigate the effects of three designs of rocker outsoles on several gait characteristics.

Method: Ten females with diabetes aged 55.6±5.25 years, with no history of previous ulceration were recruited after obtaining an ethical approval. Three designs of rocker outsole (with 10°, 15° and 20° rocker angle) which were previously shown to be most effective in plantar pressure reduction were used. Kinetic and kinematic data were collected while subjects walked either barefoot or with rocker outsole shoes at a self-selected speed. Spatiotemporal parameters and the ground-reaction forces (GRF) were measured. Repeated-measures ANOVA followed by Bonferroni Post-Hoc statistical analysis was performed.

Results/Discussion: There was no significant difference among test conditions for first GRF peak (p>0.05). Although second GRF peak was decreased by increasing rocker angle respectively, this decrease was only significant for 20° compared to both barefoot (p=0.003, Eta²=0.45) and 10° (p=0.007, Eta²=0.41); with no significant difference between 20° and 15°. There was an increase in mean step-width from barefoot to 20°, but it was significant only between barefoot and 20° (p=0.0, Eta²=0.58). Mean step-length was significantly increased with all three rocker outsoles compared to barefoot (p<0.05, Eta²>0.8). Although, mean cadence was increased by increasing rocker angle, this increase was only significant for 15° (p=0.02, Eta²=0.37) and 20° (p=0.0, Eta²=0.58) compared to barefoot. All rocker outsoles significantly increased mean step-length which is related to their specific anterior-posterior geometry facilitating propulsion. The 20° rocker outsole was the most effective design to facilitate forefoot rocker by decreasing second GRF peak and increasing the cadence. However, the significant increase of mean step-width with 20° rocker outsole might indicate a postural control adjustment for preserving balance by providing a wider base of support.

Conclusion: Although 20° rocker outsole was the most effective design to facilitate forefoot rocker, it imposed more changes on gait in diabetic patients which might concern their postural balance.
Aim: It is known that patients with diabetes can show postural instability and functional impairments increasing the risk of falls and foot ulcers. Aim of this study was to evaluate the effect of walking poles on balance and forces distribution on the foot plantar surface of diabetic patients in standing position.

Method: In 10 subjects with diabetes (males/females: 7/3; type 1/2: 4/6), mean age 59.1±16.3 yrs, duration of diabetes 18.6±12.6 yrs, mean HbA1c 7.5±1.0 %, body mass index (BMI) 26.8±5.0 kg/m², were evaluated: muscle strength*, ankle range of motion (inclinometer), orthostatic plantar pressure distribution and postural control with and without trekking poles**, posture on the sagittal plane (images of patients in quiet standing). A paired Student t-test was used to determine the difference in the means calculated with or without the use of trekking poles.

Results/Discussion: The patients showed a reduction of joint mobility greater than the group of 30 healthy controls matched for age (58.4±6.0 yrs) and BMI (26.3±3.4 kg/m²): 133.7±18.4° vs 98.1±35.1°; p <0.05. In standing, patients with diabetes showed a lower load on the right foot (dx 46.0±2.9 %) while the load on the forefoot was about 56.0±5.0 %. The use of trekking poles resulted in a not significant variation of load on the right foot (dx 48.3±3.5 %), forefoot (56.5±4.7 %), and mean velocity reduction of the center of pressure (2.5±1.3 vs 1.9±0.8 mm/sec).

Conclusion: The preliminary results of this pilot study showed that the use of trekking poles in orthostatic condition do not worsen the plantar pressure distribution between the two limbs, the forefoot and the rearfoot. The use of walking poles could then have possible positive effects on the orthostatic posture and risk of falls.

*Jamar hand grip
**P-walk baropodometric and stabilometric analysis, BTS, Italy
Aim: Diabetic foot wounds secondary to amputation, are very complex and difficult to treat. We investigated whether Negative Pressure Wound Therapy* with/without USD improves the wound healing after partial foot amputation in patients with diabetes using as a marker CFU.

Method: Diabetic foot wounds secondary to amputation, are very complex and difficult to treat. We investigated whether Negative Pressure Wound Therapy* with/without USD improves the wound healing after partial foot amputation in patients with diabetes using as a marker CFU.

Results/Discussion: The obtained data are shown in Table 1.

Table 1. The level of CFU during treatment, depending on its type

<table>
<thead>
<tr>
<th></th>
<th>before</th>
<th>After debridement</th>
<th>4th day</th>
<th>12th day</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>media</td>
<td>1st qrt</td>
<td>3rd qrt</td>
<td>media</td>
</tr>
<tr>
<td>Negative Pressure Wound Therapy*</td>
<td>83.01±17.28</td>
<td>43</td>
<td>13</td>
<td>56</td>
</tr>
<tr>
<td>Negative Pressure Wound Therapy* + USD</td>
<td>79.5±16.26</td>
<td>18</td>
<td>8</td>
<td>22</td>
</tr>
<tr>
<td>Control</td>
<td>65.13±12.55</td>
<td>41</td>
<td>10</td>
<td>61</td>
</tr>
</tbody>
</table>

Before the start of treatment, the level in all groups did not differ statistically (p = 0.0552 and 0.379). After the debridement in the Negative Pressure Wound Therapy* + USD group, he became statistically different (p = 0.007 and p = 0.0059) from the Negative Pressure Wound Therapy* group and the control group. Between themselves, the last did not differ (p = 0.15). After 4 days of treatment in the Negative Pressure Wound Therapy* + USD group, the CFU was statistically different (p <0.001 and p = 0.0128) from the control group and Negative Pressure Wound Therapy* group. Between the Negative Pressure Wound Therapy* group and the control group, the difference is significant (p = 0.0287) as well. After 12 days of treatment, there is a reliable difference between all groups. It is also a significant difference between the beginning and the 12 day treatment in all groups.
**Conclusion:** Combination of the Negative Pressure Wound Therapy* and US debridement seems to be a safe and effective treatment for complex diabetic foot wounds, and could lead to a higher proportion of healed wounds, faster healing rates, and potentially fewer re-amputations than standard care or single Negative Pressure Wound Therapy*.

*VAC therapy*
Background and aim: Diabetic foot osteomyelitis (OM) is associated with impaired healing, recurrent ulcer infection, and enhanced risk of major amputation. The standard diagnostic test for OM is isolation of bacteria from a bone sample. The impact of OM defined as a positive bone culture on long-term outcomes in diabetic foot ulcer (DFU) patients is unclear. The aim of our study was to evaluate one-year outcomes in patients with DFU and suspected OM with respect to bone culture results.

Method: A total of 86 DFU patients (mean age 61±13 years, 70 male, 63 with Type-2 DM) who underwent bone sampling for culture during foot surgery or by indirect bone biopsy between Jan-Dec 2015 were included in the study. Indications for bone sampling were deep chronic ulcers with the underlying bone, often with cellulitis, and highly suspected bone involvement. Patients were divided into two groups according to bone microbiology results and followed up for one year in terms of mortality, major amputation, new ulcer appearance, hospital admission, and need for additional surgery.

Results: Negative microbiology results of bone samples were observed in 26 (30.2%) patients, with bone microbiology positive in 60 (69.8%) patients. At one-year follow-up, 4 (15.4%) bone culture-negative patients vs. 4 (6.7%) bone culture-positive patients had died (NS). All bone culture-negative patients remained major amputation-free after 1 year, while 9 (15%) bone culture-positive patients underwent major amputation (p = 0.05). A generally high rate of hospital admissions for any reason was observed in both groups with no significant difference (46.2% vs 50.0%, NS). During one-year follow-up, no significant differences between bone culture-positive and negative patients in terms of additional foot surgery procedures (42.3% vs. 56.7%) and presence of a new ulcer (38.5 vs.35.0%) were observed.

Conclusion: Our study demonstrated an association of a negative bone culture with a better one-year outcome in terms of major amputation, while mortality, hospital admission, additional surgery, and presence of a new ulcer were not associated with bone culture results. Based on our results, it seems that a negative bone culture in DFU patients may predict a lower risk of major amputation.
Aim: Characterisation of the microbiota by identification of the bacterial DNA associated with chronic foot ulcers overcomes many of the limitations of conventional microbiology. And while identification using 16S ribosomal RNA gene sequencing is now employed in a number of fields, research has been hitherto relatively restricted in chronic ulcers. Such work has the capacity to explore the more complex relationships which might exist between different bacterial groups as well as between bacteria and their hosts. We have used these techniques to study the bacterial profiles in samples from 28 individuals with heel ulcers complicating diabetes and have sought to determine how these profiles change with repeated sampling.

Method: Participants in a parent study evaluating an off-loading device consented to have surface swabs taken using the Levine method each two weeks for 24 weeks (or until healing or withdrawal from the study). Material was frozen at -80C prior to extraction, 16S rRNA amplification, sequencing and bioinformatic analysis. Detailed data on treatments and the status of the wound were available from the parent trial.

Results/Discussion: Ulcer samples could be grouped into six clusters reflecting dominant taxa: Corynebacterium, Staphylococcus, Enterobacteriaceae, Pseudomonas, Micrococcaceae or mixed anaerobes. Ulcers consistently colonised by Enterobacteriaceae and anaerobes were less likely to heal, while a trend towards Corynebacterium and Staphylococci was observed in healing ulcers. Falling microbial diversity was observed preceding clinical infection in certain cases.

Conclusion: These early data confirm the considerable possibilities afforded by this approach and the potential for gaining further insight into the way in which the clinical status and prognosis of the wound are associated with the dominance of certain bacterial communities and the changes which may occur within them. When refined and combined with clinical findings, this approach may prove invaluable in the routine assessment and monitoring of chronic ulcers.
Aim: To evaluate and compare the microbiome of chronic neuropathic diabetic foot ulcers (nDFU) using conventional culture techniques (CCT) and mass-spectrometry approach of microbial markers (MSMM).

Method: The samples from 18 nDFU without signs of infection were sent to Microbiology laboratory in order to obtain the presence of microorganisms using CCT and to chemical laboratory for performing MSMM simultaneously.

Results/Discussion: The CCT revealed no growth in 2 specimens (4%), presence of gram-positive cocci in 5 cases (21%) including MRSA, gram-negative bacilli in 2 samples (4%), polymicrobial infection in 5 cases (21%). Anaerobes were not obtained. Obtained number of microorganisms did not exceed $10^6$ KOE/ml. Mixed genera were identified in all samples using MSMM approach. The most commonly detected bacteria were St. aureus (76%); facultative anaerobes: Streptococcus mutants (52%), Nocardia spp (24%), Streptomyces (24%); obligate anaerobes: Eggerthella lenta (67%), Clostridium spp. (48%), Clostridium ramosum (14%).

Conclusion: Mass-spectrometry of microbial markers technique revealed new information about diversity of bacteria in chronic not infected neuropathic diabetic foot ulcers. Anaerobic and fastidious microorganisms may play a significant role in delayed healing process. Further investigations are needed to study the importance of mixed genera in the development of a microbial biofilm and to use obtained data in clinical practice.
**[P18] MULTIDRUG RESISTANT BACTERIA: AN INCREASING COMPLICATION OF DIABETIC FOOT**

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**Aim:** Multigrug resistant (MDR) infections complicate diabetic foot ulcers (DFU) severely worsening their prognosis. The aim of this study was to assess the prevalence of MDR phenotypes of different bacterial strains in diabetic patients followed by our diabetic foot clinic from January 2001 until December 2014.

**Method:** We retrospectively analysed 7,826 culture results from deep wound specimens in diabetic patients (M/F: 6,065/1,761. Age: 63.2±11.7 yrs) followed by our outpatient Clinic for DFU. From all bacterial strains we selected those more prevalent and we analysed antimicrobial sensitivity pattern in relation to the more widespread antibiotic resistance phenotypes. In particular, we evaluated the prevalence of *Staphylococcus aureus* (SA), *Pseudomonas aeruginosa* (PA) and Enterobacteria (EB), sorting out Methicillin-Resistant SA (MRSA), PA resistant to Ciprofloxacin (CiproRPA) and Carbapenem (CRPA), EB resistant to Ciprofloxacin (CiproRE) or Extended Spectrum Beta Lactamase producers (ESBL). To test if the MDR pattern changed overtime, we divided the obtained results in two groups: the first (Group A) included those from 2001 until 2007 while the second (Group B) from 2008 until 2014.

**Results/Discussion:** SA was detected in 2,483 specimens in Group A and in 2,131 in Group B (NS), the presence of MRSA was 58.7% in Group A and 51.2% in Group B (NS). PA was observed in 1,428 specimens in Group A and 1,783 in Group B (p<0.03): in particular, CiproRPA was detected in 45.1% of cultures in Group A and 64.1% in Group B (p<0.04) while CRPA in 32.7% in Group A and 34.2% in Group B (ns). The presence of EB was detected in 1,516 specimens in Group A and 2,032 in Group B (p<0.001); CiproRE prevalence was 28.0% in Group A and 47.7% in Group B (p< 0.02) while ESBL prevalence was 23.0% in Group A and 39.7% in Group B (p< 0.05).

**Conclusion:** In conclusion, our data confirmed the high prevalence of MDR bacteria infections in DFU and their increasing overtime, stressing the importance of a close monitoring of antimicrobial drugs susceptibility.
Aim: To characterize the pathogens of infected Diabetic Foot Ulcers (DFU), microbiological foot infections, and analyze the association of amputation rates with multiresistant bacteria.

Method: Observational, analytical and retrospective studies were performed on 74 patients with microbiological data populations, evaluated in the Multidisciplinary Consultation of the Diabetic Foot Unit – Hospital Santo António- Oporto, from January to December of 2014. Data were analyzed using chi – square and binary logistic regression tests of SPSS 21®.

Results/Discussion: Among the 74 bacterial foot infections evaluated, 47 (63.5%) had more than one bacterial agent isolated and 13% (n=17) of it were multiresistant agents: Methicillin-Resistant *Staphylococcus aureus* (MRSA) (n=8); quinolone resistant *Pseudomonas aeruginosa* (n=6); *Escherichia coli* producers of extended spectrum betalactamase (ESBL) (n=2) and *Acinetobacter baumannii* (n=1). Among non-multiresistant agents the more frequent were: methicillin- sensitive *Staphylococcus aureus* (MSSA) (n=20); *Proteus Mirabilis* (n=10); multisensitive *Escherichia coli* (n=9); *Morganella morgani* (n=8); *Enterobacter cloacae* (n=5), *Serratia marcescens* (n=5), *Pseudomonas aeruginosa* MS (n=5), Corynebacterium spp (n=5).

All patients with MRSA, *Pseudomonas aeruginosa* quinolone resistant, *Escherichia coli* ESBL and *Acinetobacter baumannii* were hospitalized for therapy optimization except one patient that had vancomycin therapy in hemodialysis. In our study 5 of the patients infected with MRSA and 3 with *Pseudomonas aeruginosa* quinolone resistant had a score 3 in PEDIS scale, at the first assessment.

A total of 32 (43.2%) patients suffer amputation being major in four of them (at the leg or thigh level). From the 8 patients infected with MRSA six had an amputation and 4 of the patients infected with *Pseudomonas aeruginosa* quinolone resistant were also amputated.

MRSA foot infection was associated with an increased risk of amputation compared to non-multiresistant agents (OR = 5.850; 95% IC = 1.082 – 31.661; p=0.04).

Conclusion: Diabetic foot infections are frequently classified as moderate or severe and are associated with more than one microbiological agent. In the present study MRSA infection was related to a higher amputation risk, although this result should be confirmed in the future using larger study samples.
Aim: Dry to cracked foot skin in diabetics presents an entry point for bacteria and fungi. The present studies were performed to investigate the repairing and rehydrating effects of two different foam creams on the skin barrier. Furthermore, the bacterial growth in the interdigital spaces of the feet was analysed.

Method: Two separate studies were performed both as prospective, double-blind, randomised, placebo-controlled, intraindividual single center study. Study participants applied verum and placebo foam cream to their feet twice daily for 4 weeks. Study 1: Integrity of the skin barrier was measured by morphometric analysis of the quantity of intercellular lipid lamellae (ICLL) after transmission electron microscopy (TEM). High-performance thin-layer chromatography (HPTLC) was applied to analyze the Stratum Corneum lipids. Study 2: For analysis of bacterial growth swabs were taken from the interdigital spaces. Biophysical measurements including transepidermal water loss (TEWL) and skin hydration were examined in both studies.

Results: After 4 weeks of treatment the amount of ICLL as well as the content of ceramide NP is significantly increased for verum treated skin compared to baseline and placebo. The amount of ICLL for the feet treated with verum is comparable to values of healthy skin after 4 weeks of treatment. No changes in bacterial count were detected for both foam creams.

Conclusion: After 4 weeks of treatment using verum foam cream the length of the lipid lamellae equaled that of healthy skin, thus a completely repair of the skin barrier is achieved. The data show that a high-quality repair and regeneration of the skin barrier is achieved, which includes filling the gaps in the skin barrier lipid film as well as regeneration of the skin barrier to the status of healthy skin. In addition, it has been shown that verum and placebo foam cream can be applied also to the interdigital spaces, without increasing the risk of bacterial infection. The potential of the verum foam cream examined here goes far beyond the simple moisturizing effect of other skin care products. It is an approach of skin care that is tailored to the particular needs of diabetes related skin problems.
Aim: International guidelines recommend annual diabetic foot risk assessment. However, it is unlikely that, once established, risk variables can regress. We aim to study the real change in these variables after 1 year and risk progression using the International Working Group on Diabetic Foot (IWGDF) classification.

Method: A prospective cohort study including subjects with Diabetes (DM) without active diabetic foot ulcer (DFU) that underwent foot screening in our Diabetic Foot Clinic, from 01/2010 to 12/2011 was conducted. At baseline, demographic, clinical and foot risk characterization variables were collected. After 1 year follow-up, foot risk characterization was re-performed. IWGDF classification was applied at both time points. Peripheral arterial disease (PAD) was diagnosed by foot pulses palpation and diabetic peripheral neuropathy (DPN) using the 10g Semmes-Weinstein monofilament and 128 Hz tuning fork. Subjects dead or lost to follow up before 1 year were excluded (n=30).

Results/Discussion: We included 175 subjects, with mean age of 65 (±9) years, DM duration 16 (±11) years, HbA1c 8.0 (±1.6) %. All had type 2 DM, the majority were male, with hypertension. DM related complication prevalence ranged from 16% (nephropathy) to 41% (retinopathy). At baseline, 52% of participants were classified as risk group 0, 3% as 1, 20% as 2 and 25% as 3; 48% had DPN, 79% foot deformity, 17% PAD, 33% previous DFU and 9% previous lower extremity amputation (LEA). After 1 year, 50% of individuals were in risk group 0, 2% in 1, 21% in 2 and 26% in 3; 50% had DPN, 84% foot deformity, 17% PAD, 35% previous DFU and 9% previous LEA. This means that an additional 2% developed DPN, 5% foot deformity and 2% a DFU, resulting in a reduction of 1.7% and 0.6% subjects classified as group 0 and 1, respectively and an increase of 1.1% and 1.2% as group 2 and 3, correspondingly.

Conclusion: Although annual risk re-assessment is considered mandatory in diabetic foot care, we consider that with such slow progression this periodicity might be enlarged. So, never undervaluing the importance of diabetic foot direct observation, time could be spared and invested in other preventive measures.
**[P22] THE MEASUREMENT OF SKIN TEMPERATURE IN THE EXAMINATION OF THE FOOT WITHIN THE DIABETIC FOOT CLINIC**

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**Aim:** Skin foot temperatures are frequently measured in diabetic foot patients, although no measurement algorithms have been established. We report that plantar temperatures between the right foot (RF) and left foot (LF) are similar in both healthy volunteers and diabetic foot patients. Moreover, these temperatures are comparable whether measured after 10 or 20 minutes resting with a longitudinal temperature reduction of less than 1.5%.

**Method:** We studied 104 healthy volunteers and 110 diabetic patients with intact feet and past history of foot ulceration. Subjects were asked to rest barefoot on a podiatry chair with legs extended and supported. They underwent assessment with novel thermal imaging device designed by Photometrix Imaging Ltd. A plantar imaging sequence (PIS) of RF and LF was captured after 10 (PIS1) and 20 minutes (PIS2). The images were analysed by an independent scientist and the mean RF and LF temperatures were calculated. The percentage temperature change (%Tchange) of the RF and LF for patients and controls was also calculated (% T change= (PIS2-PIS1)*100/PIS1).

**Results/Discussion:** There was no significant difference between the mean RF and LF skin temperatures whether measured after 10 or 20 minutes resting in healthy volunteers (PIS1: 26.9±2.3 vs 26.8±2.3, p=0.839; PIS2: 26.5±2.3 vs 26.4±2.4, p=0.653) and in diabetic foot patients (PIS1: 25.7±2.5 vs 25.7±2.5, p=0.955; PIS2: 25.5±2.4 vs 25.4±2.4, p=0.879). Although the mean RF and LF temperatures significantly decreased from 10 minutes of resting to 20 minutes of resting in both controls and diabetic foot patients (p<0.05 for all comparisons), the %Tchange was less than 1.5 % for both groups: (healthy volunteers: %Tchange RF=(-1.2±2.7%) and %Tchange LF=(-1.5±2.5%); diabetic foot patients: % T change RF=(-1.0±2.0%) and %Tchange LF=(-1.2±2.1%).

**Conclusion:** Plantar thermal imaging indicated that the mean RF temperature is similar to the mean LF temperature in both healthy volunteers and diabetic foot patients. The observed %Tchange between 10 and 20 minutes of resting was statistically significant although a reduction in temperature of less than 1.5% has negligible clinical importance. We conclude that 10 minutes barefoot resting is sufficient for acclimatisation to enable skin foot temperature assessment in diabetic patients and healthy volunteers.
Aim: The aim was to investigate if HbA1c improves when poorly regulated people presenting with diabetic foot complications (DFC) are proactively offered person-centered support by a diabetes specialist nurse (DSN). Additional aim was to explore if diabetes related problems and wellbeing improves concurrent to treatment.

Method: A prospective intervention study with follow-up after one year. Patients referred to orthopedic surgeon in the foot clinic were consecutively recruited by systematic audit by podiatrist and DSN. During nine months, consultations and education were given and monitored by DSN. Medical treatment was supervised and delegated by endocrinologist. HbA1c was measured before and after the intervention with follow-up after one year. Psychosocial aspects were monitored with PAID and WHO-5 wellbeing index, supported by five individual interviews.

Results/Discussion: Forty-nine patients were included aged 56 ± 22 years, male 69.3%, HbA1c 88 (75-125) mmol/mol, type 1 diabetes 55%, disease duration 25.1 (2-67) years, multiple complication 85.4%. HbA1c 77.9 (40-135) mmol/mol after intervention \( p=0.0001 \), HbA1c 79.7 (53-114) mmol/mol at one year follow up \( p=0.0008 \). Forty-three 43 (87%) patients answered PAID and WHO-5. 37% had a PAID sum-score >33 indicating serious diabetes related problems. PAID improved significantly \( p=0.004 \) after nine month, and results were sustained at one year follow up \( p=0.0126 \). 35% had a WHO-5 score <50 indicating poor well-being with a significant correlation to a PAID score >33 (Spearman’s rho 0.47, \( P=0.01 \)). No significant change in WHO-5 scores was seen. Interviews revealed that living with a foot complication has an impact on all aspects of life including feeling alone with the disease, loss of socioeconomic status, feeling insecure with your body and sleep disturbances. It reveals satisfaction with better HbA1c, and effort to self-care with support from familiar Health Care Professionals (HCP). Ethical considerations for the participants made a control group impossible.

Conclusion: When people presenting with DFC are proactively offered person-centered support and care by DSN, a significant and sustained reduction in HbA1c and diabetes related problems is seen. The effort does not seem to change well-being in general. Interviews reveal efforts to self-care and the need of assistance from HCP.
Aim: Diabetic foot (DF) that may occur due to a lack of education and prevention could lead to increased morbidity and mortality in diabetic patients after organ transplantation. The aim of our study was to assess the occurrence of DF in transplant patients and risk potentially affecting its appearance.

Methods: We included into our study 57 diabetic patients (mean age 46±10.5 years, diabetes duration 28.6±10.2 years) who underwent organ transplantation (01/2013-12/2015) and were followed for at least 12 months in the transplant clinic. The occurrence of DF and risk factors potentially contributing to its development such as the function of transplant organs, the presence of late complications (93% of patients had severe neuropathy, 66.7% proliferative retinopathy or amaurosis) and PAD and level of physical activity (detected by Godin Leisure-Time Exercise Questionnaire indicated Weekly leisure activity score - WLAS and the level of strenuous, moderate and light exercise), intensity of education and prevention of DF were determined.

Results: DF developed in 31.6% (18/57) of patients after organ transplantation within 11 months on average after surgery. Only HbA1c (p=0.018), PAD (p<0.0001), TcPO2 (p=0.0003), deformities (p=0.0017) and moderate intensity of exercise (p=0.049) significantly correlated with the development of DF. Other factors such as age, diabetes duration, BMI, duration of posttransplant period, severe forms of retinopathy, renal functions after transplantation were not associated with the occurrence of DF. The intensity of physical activity remained unchanged (WLAS 31.7±24.8 in pre-transplant vs. 28.8±24.9 in post-transplant period; NS), but there was a trend to the reduction of its duration (150±94 vs. 329±153 minutes/week; p=0.12). Education was performed periodically (2.6±2.5 times on average), 94.7% of patients checked their feet 4.5±2.9 times/week, however appropriate preventive shoes worn only 26.3% of transplant patients.

Conclusion: The occurrence of DF was much higher in such risk group of patients compared to general diabetic population. Risk factors included worse diabetes control before transplantation, the presence of PAD and foot deformities. Therefore, more detailed vascular and physical examinations and more intensive education should be performed in diabetic patients before transplantation. Education should also be focused on an increase of physical activity leading to higher physical fitness under the circumstances of appropriate preventive footwear usage.

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Aim: More than 60% of diabetic foot patients require surgery operations and foot amputations. Prolonged spontaneous wounds healing associates with risk of reinfection and new operations. We estimated risk factors of healing delay and created prognosis model.

Method: We examined 108 diabetic outpatients after surgery and partial foot amputations. All of them had open wound and were treated at the Center and received standardized therapy. We excluded patients with critical limb ischemia (ABPI < 0.5). We suggested that wound healed at 12 weeks would be a good result, at 24 weeks - satisfactory result and more when 24 weeks - failure of healing. Some factors involved in wound healing were found and significances of them were assessed. Data were presented as means ± SEM. Classification trees multivariate exploratory techniques were used.

Results/Discussion: The mean age of patients was 60.0 ± 1.3 yrs, mean duration of diabetes was 12.9 ±1.5 yrs. HbA1c level was 9.10±0.47%. The mean time of wound healing was 12.7 ± 1.55 weeks. The presence of infection and osteomyelitis were detected in 57 (55.9%) and 19 (18.1%) cases respectively. The mean size of wounds was 17.0 ± 2.82 cm², and mean time of wounds presence before appeal to the Center was 13.0±2.8 weeks. We found that local parameters were major factors for delay of neuropathic wound healing. The osteomielitis was the most impotence parameter. The second one was infection. The presence of osteomyelitis and MRSA-infection was associated with delay of wound healing in 100% of cases. The combination Size (more than 10 sm²), location of the wound (forefoot or plantar face) and time before referral to the Center (more than 9 weeks) were also great determinants. There weren’t associations of age, gender, duration of diabetes, HbA1c% with time of completed healing. Severe diabetic neuropathy was also significant but not great predictor of delay healing.

Conclusion: Prognosis of wound healing in diabetic patients first of all depended on local wound parameters such as depth of damage, infection, size and forefoot localization. Diabetic neuropathy were involved in the process of wound healing along with local factors.
Aim: To examine the risk factors (including bone quality) for fractures in women with diabetes mellitus type 2 in menopause.

Method: In a cross-sectional study included 75 female with diabetes mellitus type 2 (T2DM) during 13.07±6.65 years, age of patients made up 61.83±6.89 years, duration of menopause of 11.96±7.29 years, who were hospitalized in Department of endocrinology of our hospital from 01 January 2015 to 01 December 2016. 67 (89.33%) patients received insulin therapy in a combination therapy or monotherapy with insulin. The level of HbA1C was 9.45±1.61%, the mean weight was 82.2±11.54 kg, pocr162,0±5.7 cm, body mass index of 31.44±4.36 kg/cm². During the dual-energy x-ray absorptiometry studied the mineral bone density (BMD) at the femoral neck, lumbar spine, as well as the study of trabecular bone index (TBS), that reflect the quality of bone. Estimated TBS carried out taking into account the recommendations of the European group of users of TBS, where the TBS is less than 1.2 corresponds to the the destruction of micro architecture, TBS less than 1.35, but over 1.2 – partial destruction of the micro architecture, more than 1.35 – normal structure of bones.

Results/Discussion: In 88 % of patients (n=66) revealed a reduction in index TBS. In 38 patients (50.6%) TBS was less than 1.2, which corresponds to the destruction micro architectonics. In 21(28%) patients were fractures of various localization, in 15 (20%) - low-energy fractures. Fractures of the spine had 4 (5.33%) patient. In patients with fractures significantly reduced the BMD of the femoral neck (0,77±0,12 vs 0,86±0,13, p=0.003) and lumbar spine (0,95±0,15 vs 1,02±0,13, p=0.03). Significantly lower TBS was found in the group of patients undergoing vertebral fractures (1.002±0.08, p=0,013), while in group with osteoporotic low-energy fractures the declining of TBS was not statistically significant (1.11±0.16 vs of 1.16±0.12, p=0,11).

Conclusion: BMD measurement in femoral neck and lumbar spine works in fracture risk assessment. To evaluate role of TBS in patients with DM2 we need the prospective study. Further study is needed to estimate the role of low TBS for non-vertebral fracture risk and arthropathy Charco.
Aim: Oxygen is a prerequisite in wound healing. It supports several pathophysiological processes such as cell proliferation, bacterial defence, angiogenesis and collagen synthesis. Even though the role of topical oxygen therapy in wound healing is not completely understood, many experimental and clinical observations have shown that defective wound healing is associated with localised tissue hypoxia. The diabetic foot is particularly susceptible to the adverse effects of tissue hypoxia due to complications arising from autonomic neuropathy which can preclude the systemic delivery of oxygen to the wound bed. The class II medical device* delivers pure humidified oxygen directly to the wound to optimise healing potential.

Method: 35 patients presenting with non-healing diabetic foot ulcers (≥ 6 months) were recruited from 14 specialist foot clinics in the United Kingdom. Data on 28 patients was included in this interim analysis as recruitment was ongoing. A comprehensive diabetic foot assessment was performed on the sample and in contrast to many other diabetic foot related studies, no lower limit on foot perfusion was specified within the exclusion criteria. Reviews were undertaken once a week and data on quality of life and pain was recorded once a month over the 24-week study period. Standardised digital images were taken once a week to assess the change in wound surface area.

Results/Discussion: Median age of the sample recruited into the study was 65 (Md). Over the 24-week study period the wound surface area had decreased from 1.75cm$^2$ (Md) to 0.1cm$^2$ (Md) at study endpoint. After 8 weeks of continuous therapy* the median wound surface area had decreased (48%) and at study endpoint 45% (10/22) of patients had healed. A further 15% of patients had achieved wound re-epithelialisation of greater than 80% over the 24-week duration. Six patients (6/28) from the total sample included in this interim analysis failed to complete the study.

Conclusion: The findings suggest that the application of continuous ambulatory topical oxygen therapy using the device* had a significant beneficial effect on wound healing in this hard-to-heal patient sample. Analysis on the economic significance of these findings are ongoing.

*Natrox™
Aim: To characterize foot injuries caused by rat bites in patients presenting to a diabetes clinic in Tanzania.

Method: The records of all diabetic foot ulcers (DFUs) attending between January 1999 and December 2016 were examined. People who had both rat-bite and non-rat bite DFUs were not included in the comparator group. The first presentation only of each group member was used. Differences between groups were compared using appropriate parametric and non-parametric methods.

Results/Discussion: There were a total of 426 DFUs resulting from rat bites in 179 individuals, and 9343 other DFUs in 4232 individuals. The rat bite population was significantly younger (mean 55.9 versus 57.5 years, p=0.037) and had a lower BMI (26.5 vs 27.93, p=0.008) but there was no difference in sex, race, diabetes type, diabetes duration, the number who smoked or drank alcohol. There was similarly no difference in the prevalence of either retinopathy or peripheral artery disease (30.7% vs 27.2 %, p=0.179) but peripheral neuropathy was more common in those with rat bites (90.9% vs 84.7%, p=0.012). Rat bite ulcers were seen significantly sooner after onset than other types of DFU (7.8 vs 18.2 days, p<0.001) and the overall incidence of healing was higher (85.8% vs 55.5%, p<0.001). There was no difference between groups in the incidence of either minor (4.5% vs 3.0%) or major (2.8% vs 1.9%) amputation but the mortality of people with ulcers from rat bite was higher (overall: 11.9% vs 7.3%, p= 0.021; death from infection: 9.1% vs 5.3%, p=0.032) despite no difference in mean duration of recorded follow-up (132.2 vs 142.0 days).

Conclusion: Rat bite is a cause of DFU in developing countries, and is associated with increased mortality. All rat bites occurred when the person was in bed. Appropriate protective measures should be considered for people with known neuropathy.
Aim: Previously high prevalence of cognitive disorders among diabetic foot patients was found by Suermann A. et al, 2014. The aim of our study was to investigate its possible effect on the foot protective behavior.

Method: 65 consecutive high foot risk diabetic patients of a hospital surgical department (in stable health condition) were included into the study. 82% of them were admitted due to foot ulcer/wound lesion, others had history of foot ulcer or high risk foot or leg ulcer. Median age was 60 (36-87) years, male:female ratio – 63:37%, diabetes duration: 10 (0.5-37) yrs, type 1:2 ratio – 8:92%. 46% had history of foot ulcer, 20% - of an amputation, and only 9% underwent structured group education for patients with diabetes. We elaborated and used 10-point questionnaires to assess patient’s knowledge about foot protection rules and real behavior in this field. Cognitive function was assessed by the Clock Drawing Test (CDT) interpreted according to the ADCSS algorithm.

Results/Discussion: Median number of correct answers about foot protection rules was 7.5 of 10 (0-10); self-reported practicing of these rules – 6.3 (3-10) of 10. Correlation of knowledge and practicing was moderate (r=0.05, p<0.001). Nevertheless 11% were practicing cutting off callus, 30% used chemical substances to remove callus, 55% had experience of skin injures while cutting nails. In CDT only 37% had normal results (4/5 or 5/5). Surprisingly we found no correlation between cognitive function and knowledge or behavior concerning foot protection (r=0.1 for both). These results were not changed after adjustments: exclusion of 8 patients with newly diagnosed diabetes, or of those who are younger than 60 y.o.

Conclusion: We found no influence of cognitive function on self-reported foot protection knowledge or behavior – perhaps due to relative simplicity of these protection rules and forming of some hygienic behaviors early in patient’s life. Nevertheless high prevalence of cognitive impairment should be taken into account during education of patients for more complicated activities – such as insulin dose adjustment or carbohydrate count.

Aim: Dorsal foot is a gold standard for tcpO2 measurements with validated reference range. Nevertheless, it reflects arterial blood flow in only one of the foot angiosomes. So plantar tcpO2 measurement is an attractive idea but its implementation was limited by lack of established reference range and some technical problems of the probe attachment. We elaborated a technique for the probe fixation and conducted a study aimed to establish the reference range for plantar tcpO2.

Method: 30 consecutive diabetic patients (60 legs) from a hospital endocrinology department in stable health condition were included. 7% had type 1 and 93% - type 2 DM; male:female ratio was 43:57%. Median age was 67 (49-85) years, DM duration – 14 (1-31) years. We conducted duplex ultrasound scan (DUS) to confirm vascular status, and dorsal and plantar tcpO2 measurements on both feet as well as in subclavian region (as a reference). We also semi-quantitatively assessed dryness of plantar skin as it can possibly affect the measurement results.

Results/Discussion: DUS revealed significant (70% or more) stenoses or occlusions, mainly asymptomatic, in 18 legs which were excluded from further reference range assessment. In legs with good blood flow median plantar pO2 was significantly higher than dorsal one (69 (43-86) vs. 45 (30-107) mmHg, p<0,001). Nevertheless, reference range for plantar pO2 calculated as M+/-2SD equaled 44-91 mmHg. Median subclavian region value in these patients was 53 (34-95) mmHg. Plantar and dorsal pO2 values constituted 131(63-206)% and 90(42-162)% of the subclavian one, respectively (p<0,001).

Only 2 feet (3%, not enough for statistical analysis) had severe skin dryness; we found no significant difference in pO2 value between those with mild (36%) or no dryness (58%).

Conclusion: This pilot study demonstrated that reference range for plantar pO2 measurement may be different from the dorsal foot one. Further studies should assess cut-off points, i.e. prognostic value of several degrees of plantar pO2 reduction in critical limb ischemia. Patients with severe skin dryness may need elaboration of special fixation rings.
Aim: Revascularization is necessary for treating chronic lower extremities ulcer with peripheral arterial disease. Sometimes it doesn’t undergo for many reasons. In this time, critical limb ischemia patients have limit of hip joint and knee joint movement due to cerebral and vertebrae disorder. So they don’t take revascularization because limit of range of movement. We treat their improvement of range of movement by botulinum toxin therapy (BTX) and they take revascularization.

Method: 6 CLI patients hospitalized at Department of cardiology, Kasukabe chuo general hospital weren’t able to take revascularization, because they have limit of hip joint and knee joint movement due to lower limb spasticity. 2 males and 4 females, total 6 patients(72.5±1 2.8 years) was enrolled, 1 with only limit of hip joint movement, 5 with limit of hip joint and knee joint movement. We use 200 - 300-units of Botox*.

Results/Discussion: All patients improve range of movement by BTX and take revascularization. There were no complications from injection. Extension movements of hip joint from -30°(-15°〜-40°) to -23.75°(-10 〜-40°) and extension movements of knee joint from -28.75°(-15°〜-45°) to -18.75°(-5°〜-35°) after BTX.

Conclusion: CLI is one of polyvascular disease, so some CLI patients have CVA and lower limb spasticity. Hard spasticity often causes them not to undergo revascularization. BTX is very effective therapy in this case.

*GlaxoSmithKline, Japan
[P32] UTILIZATION OF CRIOPRESERVED ARTERIAL HOMOGRAFTS IN THE REVASCULARIZATION OF THE COMPLICATED DIABETIC FOOT

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Aim: Arterial ischemia is associated with infection as the main predisposing factor for major amputation in complicated diabetic foot. Patients with complicated diabetic foot should be screened for arteriopathy. If revascularization is required, the options are to perform angioplasty using endovascular techniques or to perform shunts in cases of longer and more complex obstructions. In the case of derivations to infrapopliteal arterial trunks the use of saphenous vein as graft is essential since the permeability of the synthetic grafts at that level is very reduced and in the cases of patients with active ulcers the risk of infection of the prosthesis is high.

Method: We present our experience in 2016 in the HUMV in the use of cryopreserved arterial homografts in the revascularization of patients with complicated diabetic foot and risk of limb loss in which endovascular treatment is not possible or has failed and has no saphenous vein available.

During the year 2016, 5 distal revascularizations were performed in diabetic patients by means of cryosurgery-assisted arterial homografts. The mean age of the patients was 62 years (42-78). All patients presented critical ischemia two patients had ischemic pain at rest and three patients had ulcers and necrosis.

No autologous saphenous graft was available.

Except in one case that was the first revascularization intervention in the rest, it was reoperations.

In all cases proximal anastomosis was performed in a common femoral.

Results: The early primary permeability was 100%. In one patient it was necessary to perform a thrombectomy at 3 months and recover in graft.

The limb salvage rate has been 100%. In both patients with pain at rest, the clinic has disappeared, remaining asymptomatic. In two patients with necrotic ulcers, a minor amputation with complete healing has been performed and in one case a cutaneous graft with good evolution and closure of the ulcer has been performed.

Despite treating patients with infective active ulcers, no infectious complications have occurred.

Conclusions: The use of cryopreserved arterial homografts in distal revascularizations in diabetic patients is a useful tool, both for its permeability rate and for its resistance to infection.
Aim: A new initiative was set up in Northamptonshire to provide a Rapid Vascular Access Clinic. The primary aim was to identify diabetic patients with PVD and non-healing diabetic foot ulcers and expedite their access to a Vascular Surgeon working in partnership with a Diabetes Specialist Podiatrist. Historically the vascular service has run as a central access hub based at another hospital with an on-call rota of Consultant Vascular Surgeons with initial access to clinics for diabetics involving a 2-6 week wait.

Method: A retrospective review was undertaken to compare the Rapid Access Vascular Clinic versus the conventional referral route with outcomes for the patient at 3, 6 and 12 months.

Results/Discussion: Early data from this new initiative is encouraging, at the same time highlights a complex case load of high risk factors and co morbidities to clinically navigate and explore. 50% of patients assessed converted to a vascular surgical intervention, 42% managed conservatively due to various comorbidity and frailty risks. 5% were considered palliative and 3% have active current follow up. Access to Vascular Surgeon is now on average 5 days compared to previous 2-6 week wait. Vascular intervention unless emergency is now on average 5 week compared to previous 14 weeks. Initial outcome data of patients receiving early vascular interventions is indicating 88% of patient with diabetic foot ulcers at 3 month review have demonstrated progressive healing with 12% completely healed. Patients previously reporting ischaemic pain have noted a marked improvement in their symptoms.

Conclusion: The preliminary data from this new initiative suggests an improvement in healing rates, reduction in ischaemic pain and possible decline in patients that may have faced major amputation. Also, it has improved patient experience and has at least sustained their existing quality of life and in fact has improved it in a significant proportion of the caseload.

The further benefit is that it has eradicated the challenge of patients “lost to the system” whose outcomes are traditionally worse. Improved direct communication, continuity and effective partnership with Vascular Surgeon has had a positive benefit on the patient’s clinical management.
Aim: Diabetic peripheral neuropathy (DPN) is the most common diabetic complication. Increased aortic stiffness, measured with the carotid-femoral pulse wave velocity (PWV), has been associated with incident of cardiovascular disease independently of traditional risk factors. Previous studies have reported associations between risk factors for macroangiopathy with DPN in diabetes. However, the association between PWV and DPN is unknown. The aim of this study was to examine the association between PWV and presence as well as severity of DPN in patients with T2DM.

Method: A total of 381 patients with T2DM were recruited. PWV was measured at the carotid-femoral segment using applanation tonometry. DPN was assessed by measuring the vibration perception threshold (VPT), the Neuropathy Symptom Score and the Neuropathy Disability Score (NDS).

Results/Discussion: Participants were classified as having DPN (107) and not having DPN (274). Patients with DPN were more often male and older ($p<0.05$), had longer diabetes duration, higher height, larger waist circumference, higher arterial blood pressure and higher PWV (all $p<0.001$). Univariate logistic regression analysis demonstrated that there was significant association between the presence of DPN and age, gender, diabetes duration, height, waist circumference, peripheral and central SBP, PWV, dyslipidemia, HbA1c, retinopathy and nephropathy. Multivariate logistic regression analysis, after adjustment for age, gender, waist circumference, peripheral and central arterial blood pressure and nephropathy, demonstrated that the odds [OR (95% confidence intervals)] of peripheral neuropathy were significantly and independently associated only with height [1.070 (1.038-1.103), $p<0.001$], diabetes duration [1.051 (1.017-1.087), $p=0.003$], HbA1c [1.579 (1.261-1.978), $p<0.001$], PWV [1.202 (1.081-1.337), $p<0.001$], dyslipidemia [2.425 (1.311-4.488), $p=0.005$] and retinopathy [4.589 (2.361-8.918), $p<0.001$]. In addition, multivariate linear regression analysis, after controlling for age, gender, arterial blood pressure and nephropathy, demonstrated that increased NDS score was significantly and independently associated with height [standardized regression coefficient (beta)=0.247, $p<0.001$], diabetes duration (beta=0.118, $p=0.042$), HbA1c (beta=0.112, $p=0.038$), PWV (beta=0.232, $p<0.001$) and retinopathy (beta =0.286, $p<0.001$).

Conclusion: Our study implies that in patients with T2DM increased PWV is associated with DPN beyond the known risk factors. More importantly, increased PWV is associated not only with the presence but also with the severity of DPN.
Aim: Diabetic Patients suffering from arterial disease undergo a severe functional limitation related to the reduction of power reserve or to major and minor amputations. According to our experience the vascular rehabilitation plays a role in stabilization/improvement of vascular disease as well as a metabolic functional improvement and quality of life.

Method: 105 PAD patients with and without neuropathy were selected from revascularized (70) and unfit to revascularization (35) patients. Over 70% in secondary prevention. An individual rehabilitation project (IRP) together with therapeutic education intervention was formulated: postural re-education, stimulation of proprioception, respiratory gymnastics, activities to treadmill. Also SF 36 on the perception of their health was tested. All patients (estimated for suitable footwear and insole) performed 60 minutes cycles three times/week for two months. Incoming and outgoing, basal blood glucose test, BORG for fatigue and dyspnea, perimeter of the treadmill, blood pressure and heart rate were evaluated.

Results/Discussion: No cardiovascular complications during treatment, only two patients discontinued for issues not related to vascular or diabetic disease, bone and joint complications. In all patients there was at least one walk distance range increasing of 100%, the SF has documented an improvement in the perception of health status, together with a better control of blood pressure and blood glucose values and heart rate. No significant changes observed between the two groups: those revascularized in which was recovered a good distal perfusion, generally have a higher performance than non-vascularized, but the increase was still present in both groups. No recurrent ulceration or prelesions during the rehabilitation treatment wearing the adequate shoes. The immediate results of the treatment are both objectively and subjectively very good acting on the multiplicity of factors present in the diabetic pathology, not last at the patient's awareness of their disease and the ability to handle it.

Conclusion: In conclusion, the vascular rehabilitation treatment (performed with the right footwear and insole above all in secondary prevention) represents an important therapeutic aid in the treatment of arteriopathic diabetic patients with and without peripheral neuropathy and must be included in the algorithm of the diabetic foot therapy.
Background: Critical limb ischemia (CLI) in diabetic patients is a risk factor of limb amputation and mortality. Timely done complex treatment of CLI in diabetic patients reduce the amount of amputation and improve life prognosis. However, there is little evidence of long-term results of CLI treatment in diabetic patients.

Aim: To evaluate the long-term results after percutaneous balloon angioplasty (PTA) in diabetic patients with CLI.

Materials and methods: In 2010-2012 were recruited 85 diabetic patients with CLI. Diagnosis and treatment of CLI were based on recommendation of TASC II. There were 54(63%) men, with mean age 64,1[54-68] years, diabetes type 1/2 - 8/73 (9,4/90,6%), mean duration of diabetes 16,5[0,8-43] years, mean HbA1c 7,9±1,4%. Myocardial infarction (MI) and stroke in anamnesis were in 25(15%) and 15(9%) patients, respectively. Minor amputations in anamnesis – 17 (20%) patients. GFR<60ml/min - 29 (34%). Peripheral arterial disease (PAD) 4-6 classes according Graziani classification were in 69 (93%) limbs; Rutherford classification: IV category-15 (15%), V-51(53%), and VI in 30 (31%) patients. All patients were undergoing to PTA in 96 limbs with technical success in 96%. Patients with foot ulcer and gangrene were underwent to treatment including debridement, atraumatic dressing, minor amputations in 15 (17%) cases, antibacterial therapy if it needs. The primary outcome was common survival, secondary outcome were cases of repeat PTA, and major amputations.

Results: During 5 years there were 28(29%) cases of repeat PTA due to CLI recurrence. There were major amputations in 6 (7%) patients; common survival - 66 (77%). Death’s reasons were: MI- 6 (7%), stroke – 1(1,2%), 4 (4,7%), sepsis – 1 (1,2%), unknown reasons – 7 (8,2%).

Conclusions: Diabetic patients with CLI have severe morphological lesions of lower limb arteries and foot ulcers and gangrene in most cases. Complex successful CLI treatment including PTA decrease the risk of major amputations. Timely reintervention in diabetic patients with recurrent CLI promotes better limb salvage and common survival. Potentially active follow up in diabetic patients with CLI and severe comorbidities will improve common survival.
What degree of blood supply and infection control is needed to treat forefoot diabetic critical ischemia with foot osteomyelitis?

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Aim: Diabetic foot ulcer with ischemia and infection can be difficult to treat. No studies have investigated the levels of blood supply and infection control required to treat such ulcers. We previously proposed a surgical treatment strategy for diabetic forefoot osteomyelitis (DFO) based on magnetic resonance imaging (MRI) and histopathology¹-³. In this study, we demonstrate a specific method to control infection and ischemia to increase the likelihood of limb salvage.

Method: We retrospectively studied the records of 30 critical limb ischemia (CLI) patients (26 men, 4 women; mean age 68.4±11 years, range 40-89 years) treated for forefoot DFO at our institutions from 2009 to 2016. After a total of 44 surgeries based on our previous methods, we investigated patient background (age, sex, hemodialysis), infection status (pre-, post-, 1-week, 2-week postoperative C-reactive protein [CRP] level (mg/l)), vascular supply (skin perfusion pressure [SPP] (mmHg)), ulcer size (Rutherford 5 or 6), and surgical bone margin (with or without osteomyelitis) between the healing group and the non-healing group.

Results/Discussion: After a total 44 surgeries, 28 ulcers healed and 16 did not. Pre-operative CRP (15±17 vs. 43±32; p<0.05), SPP level (54.2±14.1mmHg vs. 36.4±14.8mmHg; p<0.05), and the number of Rutherford 6 ulcers (p<0.05) differed significantly between the groups.

Conclusion: To treat diabetic CLI with foot osteomyelitis, osteomyelitis should be resected completely, and if the preoperative CRP is greater than 4, debridement should be performed first to control infection. An SSP value of at least 40mmHg is needed to heal any wound. However, our results indicate that an SPP of 40mmHg is insufficient for the treatment of infected diabetic CLI, and 55mmHg is the median value needed for success even after complete resection of osteomyelitis.

Aim: The aim of our study was to assess the effect of removable contact splints (RCS) for healing of DF and postoperative complications in patients with DF after surgical procedures.

Methods: We enrolled 137 patients with DF in our observational study, whose underwent foot surgery and were treated using one type of off-loading device only. Patients were followed until DF healed or for at least 3 months up to a maximum of 12 months. Based on the type of off-loading used, patients were divided into 2 groups and compared in terms of patient characteristics and therapy outcomes (e.g., percentage of healed patients and their healing time, duration of antibiotic therapy, number of re-amputations).

Results: 21.2% of patients were treated using a combination of wheelchairs and RCS (group WR), 78.8% were treated using other off-loading devices (group O). Surgical procedures were performed in 65.7% of patients on the forefoot, in 26.3% on the midfoot and in 8% on the hindfoot. In addition to age (p=0.003) and peripheral arterial disease (p=0.02), the study groups did not differ significantly with regard to basic characteristics, including the presence of osteomyelitis and mean values of TcPO2. We found there was significantly better healing of DF (totally 75.9% vs. 63.9% of healed patients, NS; healing in the hindfoot was 75% vs. 14.3% of patients; p=0.088), shorter healing time (totally 14.2±8.6 vs. 17.6±11 weeks, NS; healing time for midfoot-operation patients was 10.7±6.4 vs. 21.1±8.6 weeks; p=0.008), shorter antibiotic therapy (totally 11.9±11 vs. 14.3±11.3 weeks, NS; in midfoot-operated patients 11.2±12.9 vs. 15.6±10.3 days; p=0.048) and lower numbers of re-amputations (0.17±0.4 vs. 0.56±1.1 patient; p=0.078) in the WR group compared to group O. Lower numbers of re-hospitalisations (0.34±0.9 vs. 0.69±1.1 patient; p=0.0032), which were of shorter duration (3±7.7 vs. 8.5±14.3 days on average; p=0.02), were recorded for the WR group in contrast to group O.

Conclusions: RCS combined with the use of wheelchair seems to be a more effective off-loading device than other off-loading methods. RCSs accelerated healing processes after surgical procedures especially in the hindfoot, reduced healing time and antibiotic usage and, moreover, decreased postoperative complications, e.g., the number of re-amputations by up to 70% and the number and duration of re-hospitalisations by up to 50% and 65%, respectively.

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Aim: This study evaluated a new offloading device* which may potentially help treat diabetic foot ulcers (DFU) and accelerate wound healing by providing a better blood flow to the foot and ankle via a pneumatic pump to compress the plantar arch. The new offloading device* has been designed to look like a normal foot device and may provide better balance and walking quality compared to other standard devices. The device is also able to monitor wear-time for the patients.

Method: Three ambulatory subjects with unilateral diabetic foot ulcers (Age=53.6±1.4 years, BMI=30.3±2.1 kg/m²) have been enrolled in this study. Each subject performed two 15-free walking tasks by wearing standard offloading boot or the new offloading boots* while having wearable sensors to measure their gait parameters. Fore-foot plantar pressures for both the offloaded and the contralateral foot as well as limping (estimated by the difference in stance % between right and left side) were estimated. Participants were given the new offloading boots* and were re-visited in 1 week and 4 week follow ups. Wound size and skin perfusion pressure (SPP) were measured at follow up visits.

Results/Discussion: The fore-foot peak pressure in the new offloading boots* trials, when compared with the standard offloading boot trial, decreased by 13% and 79% for the offloaded and the contralateral foot respectively. Limping decreased by 32% when wearing the new offloading boots*, showing a more symmetric gait.

Between week 1 and week 4 follow-ups, the SPP values for the ulcerated feet and contralateral increased by 195% and 75%, the average daily wear-time increased from 3 hrs to 5.8 hrs (96% increase), and the area of the ulcers reduced by 52%.

Conclusion: The use of bilateral boot* improves offloading, balance and gait which may enhance the adherence to the treatment by the patients. A larger sample size is needed to confirm the observed trends.

*PulseFlowDF™
**Aim:** The aim of this investigation is to critically evaluate the current diabetes foot screening guidelines with a view to examine the relevance of the recommendations relating to advancement in clinical practice, improvement in technology, and change in socio-cultural structure to provide ways of improving existing screening methods which could save limbs. The evidence leading to these recommendations were evaluated to check the quality and compared against each other.

**Method:** A literature search was conducted within standard scientific and clinical databases namely; Pubmed/Medline, SCOPUS, CINAHL, Google Scholar and Cochrane Register of Controlled Trials between January 2011 and January 2015 using the keywords ‘(Diabetes) AND (Foot Screening) AND (Guidelines)’.

**Results/Discussion:** Ten complete diabetes foot screening guidelines were identified and selected for analysis. Six included the full-process guidelines recommended by the International Diabetes Federation. Evaluation of existing diabetes foot screening guidelines showed substantial variability in terms of different evidence-based methods and grading systems to achieve targets, making it difficult to compare the guidelines. Some guidelines were unclear how the authors have derived the recommendations. We recommend that detailed information regarding the sources of the evidence used in each guideline should be clearly reported. This will enable new guideline developers to refer to the work performed and published by others as ‘source’ guidelines, and to optimize and standardize diabetes foot screening guidelines in their country. Furthermore, evidence needs to be reviewed on a regular basis as new research emerges. Although there are updates to the guidelines they don’t seem to encourage new research and innovation which can then be translated into clinical practice to reduce diabetic foot complications. Limitations of currently available guidelines and lack of evidence, on which, the guidelines are based are responsible for the current gaps between guidelines, standard clinical practice, and development of complications. Large-scale, randomized trials are needed to demonstrate the benefit of various foot screening recommendations and improve outcomes.

**Conclusion:** A paradigm shift on how to screen for risk factors in the high-risk population using high-quality evidence is urgently needed should the risks of foot ulceration and its devastating consequences be reduced.
SMART-FOOT PROJECT: SCREENING, MEASURES, ASSESSMENT, REACTION AND TIMELY REFERRAL OF DIABETIC FOOT PROBLEMS

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Aim: Inadequate risk assessment and treatment of diabetic foot problems (DFP) in primary care and late referral to diabetic foot clinics (DFC) lead to loss of foot tissue or amputation. The SMART-FOOT project is designed to increase knowledge and skills for the prevention and approach of DFP in primary care and to improve the collaboration between GP’s and DFC’s.

Method: Development of an innovative hands-on teaching module where logical thinking about diabetic foot, reflection on the organization of care and teaching practical skills are key subjects. Care was taken to create constructive interaction allowing GP’s to discover themselves the challenges in a non-accusing way. The first version of the teaching module was developed by an experienced DFC in collaboration with local GP’s. Several test-runs were used to optimize the teaching techniques in collaboration with the diabetic foot working group of the Belgian Diabetes Liga, leading to the development of a quality improvement teaching package for GP’s.

Results/Discussion: An interactive lesson of 1.5h was created. The teachers are local DFC teams and the target audience GP’s and other caregivers of primary care. The topics covered are Screening (inspection, pulses, monofilament and/or touch test), which Measures when screening is abnormal, how to Assess the severity of a diabetic foot ulcer, how to React (first aid in primary care) and how to refer Timely (with FOOT attack and the use of the SMART phone for sending a photo for urgent teleconsultation). Several teaching techniques are used: roleplays, use of fake ulcers (with inbuild metal to practice probe to bone), evaluating footwear, application of safe bandages, etc. Teach the teacher sessions are organised to instruct Belgian DFC’s to approach their GP’s and use this interactive module. The success of the project will be monitored on the basis of the number of DFC’s that participate, the number of GP’s reached and on the basis of evaluation forms.

Conclusion: It is feasible to develop an interactive hands-on teaching module on the practical approach of diabetic foot in primary care. A national program is launched to spread the use of this module in Belgium.
Aim: Endowed with the indomitable will to stop the silent drama within the shoes, and awareness of limitations presented by non-specialized health professionals who deal with diabetic foot problems on a daily-basis, the desire to organise a practical training arose. We aim to evaluate the results and degree of satisfaction of the trainees after one year of experience.

Method: We designed a course starting with theoretical background communications followed by practice sessions, including hands-on modules and clinical cases with real patients. We applied an anonymous questionnaire retrieving aspects of the course, with grade classifications NS- "not satisfied", PS- "poorly satisfied", I- "indifferent"; S- "satisfied"; VS- "very satisfied"; DK/NR- "don’t know/respond". We revised trainees’ answers.

Results/Discussion: To date, we have completed 4 courses encompassing general practitioners, nurses and podiatrists, within a total of 105 trainees. To all questions, the most prevalent answer was VS.

Regarding the evaluation of the theoretical module, the question about the relevance of the contents showed that 92.4% of the trainees were VS, with 90.5% of them being VS about the quality of the lectures. The overall evaluation of the practical benches was VS in 82.5%, meeting “VS” in 89.5% of answers about the quality of the training material, and 80% regarding the possibility of interaction with these same materials. From the general evaluation of the course, we scored 87.6% VS to the question about the relevance of the course to the daily professional activity, with 78.1% of trainees being VS with the acquisition of skills in the evaluation of patients with diabetic foot. 100% of participants said they would recommend this course to co-workers.

Conclusion: The success in the treatment of diabetic foot arises from the commitment between the health professional and the patient. Only trained professionals, alert to their individualities, will achieve the best results. According to the evaluation of the trainees, this sharing of experiences, methodologies and simple ways of being with the patient proved to be very satisfactory, motivating us to continue this exchange of knowledge, believing that it’s possible to keep our patients walking on both feet throughout their life.
A TRAINING VIDEO ON DIABETES FOOT ASSESSMENT: AN EFFECTIVE AND VERSATILE RESOURCE FOR MULTIDISCIPLINARY TEAM

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Aim: The need for screening large number of individuals for diabetes foot problems poses challenges of manpower and training. Screening needs to be performed by a variety of healthcare professionals. Face-to-face training is important but further educational adjuncts may be helpful. In our institution the screening is performed by a multidisciplinary team. All undergo training using traditional methods. However, an audit using UK National Diabetes Inpatients Audit (NaDIA) templates in 2014 showed inadequate rate of inpatients’ assessments. Feedback from the team highlighted the need for targeted training. Our aims were to: establish the need for a resource on diabetic foot examination, produce a training video, ensure access, assess its impact on training and inpatients screening rates and guarantee wider dissemination.

Method: Production of a video on diabetic foot examination meeting the national standards (Diabetes UK 2011, TRIEpodD-UK 2012, FRAME) as an adjunct to our training programme. Staff questionnaires to evaluate the initiative and national diabetes inpatients audit to assess its impact on clinical practice, dissemination using IT platforms.

Results/Discussion: The video was made available on our hospital intranet and its youtube channel. Evaluation questionnaires were completed by 16 healthcare professionals before and after its introduction. These showed an improvement in skills in 50% and in confidence in 56% (P<0.05). 93.7% graded the video as very helpful. The NaDIA data showed an improvement in the inpatients screening from 32.7% to 80% (P <0.05) between 2015 and 2016. The internet link has also been shared with a number of other organisations including our local district clinical care commissioning organisation, the regional postgraduate specialist training provider, the London School of General Practice and the Health Education England communication network.

Conclusion: This is the first training video widely available in the UK, meeting defined standards and specifically designed for health care professionals. The introduction of our video training in our unit was highly successful. This resource is a versatile, inexpensive and long-term adjunct to face-to-face training. The video is freely available for viewing on the Homerton University Hospital youtube channel by direct link* or by searching for ‘diabetes foot assessment homerton’.

*(https://www.youtube.com/watch?v=XU2XdBnPuYA)
Aim: The opinion survey was conducted to gather insights from doctors after participation in Diabetic foot education program (DFEP) India.

Method: A national level survey was conducted among 377 doctors across India from November 2016 to January 2017 based on a structured questionnaire and the responses were analyzed descriptively.

Results/Discussion: A total of 377 doctors participated in the DFEP program opinion survey. Two hundred and sixty one doctors responded that they are running an independent diabetic foot clinic.

The 44.4% of doctors reported that they see < 5 diabetic foot patients in a week, 42.8% of doctors reported that they see 5-10 diabetic foot patients in a week; whereas 8.9% and 4% of doctors reported that they see 10-25 and >25 diabetic foot cases in a week, respectively. Most of the diabetic foot cases were non-ischemic cases followed by ischemic foot cases and Charcot foot.

25.7% of doctors in the survey reported that they use comprehensive clinical examination, optimal preventive and therapeutic care, callous removal and dressings in the treatment of diabetic foot. 23.4% of doctors stated that they use the tuning fork and monofilament, and 17.7% of doctors responded that they use the tuning fork, monofilament and biothesiometer as basic instruments for managing diabetic foot. Regarding referral practice, 87.8% of doctors reported that they refer up to 5 diabetic foot ulcer patients to specialists/super specialists per week. 23.8% of doctors reported that they refer diabetic foot cases to surgeons and 13.3% of doctors reported that they refer diabetic foot cases to surgeons and vascular surgeons. The commonest co-morbidities associated with diabetic foot include neuropathy > peripheral vascular disease > renal disease > diabetic retinopathy. For carrying out diabetic foot education, 15.9% of doctors reported that they use pamphlets, videos, diabetic foot apps and posters.

Conclusion: DFEP allowed doctors to start their own diabetic foot clinic successfully. Clinicians are effectively using diagnostic tools for assessing nature and severity of diabetic foot. There is still need to create awareness of diabetic foot problems so as to ensure effectiveness in the management of diabetic foot in the patient population.
Aim: Diabetic Foot Ulcers (DFU’s) are a major complication of Diabetes Mellitus, with 1 in 10 patients being affected. With an increase risk of depression, and a 50% 5-year mortality rate, DFU’s pose as a significant prognostic factor for patients. Despite this, only 85% of patients receive an annual foot assessment, and only 49.2% of ulcers heal within the NICE recommended 12-week period. Care Planning could be an effective way of managing DFU’s, as well as engaging patients and improving their quality of life (QoL). The aim of this study is evaluate the effectiveness of Care Planning on the QoL of patients with Diabetic Foot Ulcers.

Method: A unique Diabetic Foot Care Plan (DFCP) was created using the Year of Care framework. To assess its effectiveness, changes in QoL using the ‘Wound Quality of Life’ questionnaire between patients receiving standard care and patients receiving the DFCP was compared. The effectiveness of the DFCP was also assessed through patient and staff feedback. 40 patients were recruited to control (20) and intervention (20), and changes in Wound QoL were assessed over a 4-6 week period.

Results/Discussion: Qualitative analysis showed the DFCP to be user friendly and engaging for patients. It allowed them to discuss the key issues relating to their care, as well as creating personalized goals around them. Furthermore, 35% of patients were screened positive for low mood with the PHQ-2, and hence appropriate assessment and referrals were made for them.

Conclusion: Care Planning has been shown to be a holistic method of managing DFU’s that engages patients and integrates them into decisions regarding their own care, as well as improving depression diagnosis. Further research is required to assess the benefits with other outcomes such as wound healing and ulcer prevention. Future development of the DFCP will include updates on assessments of cognitive function and self-management education. Once updated, it will be integrated into the IMPARTS system at Guy’s & St Thomas’ Hospitals. This will improve the screening pathways and referrals, and provide a more efficient way of delivering the DFCP. This in turn will improve the management of DFU’s.
Aim: To determine whether the initiation of the diabetic foot MDT reduces patient mortality and morbidity.

Method: 100 patients presenting to podiatry services (prior to MDT initiation) were compared to 100 patients presenting to an established MDT. Baseline data included: cardiovascular history, renal failure, hypercholesterolemia, smoking status, prior foot complications/amputations, HbA1c, CRP, and WCC. Patients were followed up for 12 months. Primary outcomes were: death, major amputation, sepsis induced AKI/MI, antibiotic complications (C Diff. infection, vancomycin induced AKI, anaphylaxis). Sub-analysis was conducted on patients new to foot services, having never received foot/vascular intervention in the past.

Results/Discussion: 14 amputations occurred in both groups (p 1.00), suggesting patients are being referred too late for limb salvage. 17 deaths occurred in MDT vs 31 in non-MDT groups (p 0.02), highlighting the MDT’s role in reducing mortality. Sepsis outcomes: 11 in MDT vs 6 in non-MDT groups (p 0.205), and antibiotic side effects: 5 in both cohorts (p 1.00), suggesting that the MDT does not affect these factors or that more rigorous MDT assessment is picking up these outcomes. Kaplan-Meier analysis showed no difference in time to amputation, but demonstrated improved long-term survival, suggesting relatively rapid benefits of medical management in improving survival. Sub-analysis of 51 new patients found that this statistical significance was lost, with 0 vs 3 amputations (p 0.920), and 2 vs 6 deaths (p 0.173) in MDT and non-MDT groups, suggesting positive outcomes may be influenced by prior foot interventions and not the MDT itself. However, patients in the sub-analysis may have poorer foot health as they have never attended specialist foot services before, potentially explaining the increase in negative outcomes. This study should be repeated in the future, as the MDT was newly established in this study and may not yet be working at full efficiency, which could confound results.

Conclusion: The MDT does not reduce amputation rates, but may reduce mortality. However, when examining new referrals only, no significant difference in mortality can be seen. This may suggest that apparent improvements in mortality with MDT management may be confounded by prior medical/surgical intervention and not the MDT itself.
Aim: Report our data follow-up, about diabetic foot unit based on Toe-Flow model.

Method: All diabetic foot patients from November 2009 to July 2012 were enrolled. History of patient, neuropathic and vascular screening, ulcer classification and surgical interventions were evaluated. On follow-up, endpoint as wound closure, reulceration, major or minor amputations, exitus and type of revascularization and survival were evaluated.

Statistical analysis: Chi-squared test and ANOVA, adjusting in both cases by the Bonferroni method were included. SPSS 17.0 for Windows was used.

Results/Discussion: 288 diabetic patients were consecutively included. Mean age was 68.0+-12.4, 73.5% were male. Mean diabetes duration was 16.6+-12.1 years, and HbA1c was 7.5%+-1.5%.

Total DFUs was 404 (p<0.05 digital Vs midfoot). Previous our first visit, 26.2% had an evolution longer than 6 weeks. Of this 404 DFUs, 154 had re-ulceration (38.1%) (p<0.001 digital, metatarsal and midfoot Vs heel). Ischemia was presented on 70.2% of DFUs. 77.2% of 558 DFUs (404 + 154 reulcerations), were healing during follow-up. Mean of days until healing were 84.6±97.5 days (p<0.05 digital Vs heel location, NS between the others locations).

According to University of Texas Wound Classification System: group A: 18.2%; B 9.7%; C: 52.2% and D: 20%. Grade III were more common with a concomitant infection (50% group B; 61.3% group D vs 5% group A and 6.6% Group C). Without infection, superficial DFUs are similar on patients with or without ischemia (NS: 72.1% vs 77.2%). Location of DFUs according depth were similar on group A and C; and group B and D (NS).

Revascularizations were performed in 124 subjects: 23.4% open, 71.8% endovascular and 4.8% hybrid. 18 major amputations were performed (6.3%) and 157 minor amputations to 104 patients (36.1%). There were 17 exitus during follow-up.

Conclusion: These results obtained, maybe improvable, are comparable to that described in the literature, especially if we consider the high number of ischemic patients and their high comorbidity. These results justify the creation of units based on Toe-Flow model.
Aim: Medicine legislation changed in August 2013 permitting Podiatrists to become Independent Prescribers (IP). Northamptonshire Healthcare Foundation Trust (NHFT) High Risk and Diabetic Foot Service successfully has 2 Diabetes Specialist Podiatrists (DSP) qualify as IP. The aim of the audit was to evaluate the safety, effectiveness and timely outcomes if integrating IP into an outpatient Diabetic Foot Service.

Method: Over a 6 month period from October 2016-March 2017 the DSP prescribing was reviewed. The cohort included all diabetic adults with mild or moderate foot infection, which were treated with oral antibiotics. Measurement included the number of prescriptions issued, the range of medicines, medicine management, scope of practise, errors, adverse drug reaction (ADR) and in line with trust guidelines.

Results: Over the 6 month period 93 prescriptions had been written for 57 diabetic foot ulcer (DFU) patients. Antibiotics were the most common drugs prescribed involving 8 different drugs. No prescribing errors, no incorrect drug, dose or miscalculations noted. Patient satisfaction improved due to a seamless process for prescribed medicine. IP significantly showed less interrupted courses for long term antibiotics treated for osteomyelitis and therefore reducing the risk of antimicrobial resistance and also in relapse of infection. The efficiency increases to immediate with IP rather than the patient having to wait to receive a prescription, via the GP. A delay in receiving antibiotics created a higher risk of a deteriorating DFI with risk of patient admission, amputation and limb loss. Of the 93 prescriptions written there were no ADR reported.

Conclusion: This audit suggests NHFT DSP shows easier and improved timely access for patients to get the required medicines, improving patient care without compromising patient safety. IP is able to deliver care closer to home, supporting patients to remain in work, providing patient satisfaction. Improvement of treatment results with safe and effective integration of IP into the Diabetes Team, contribute to a flexible team across the health service. This short audit demonstrates that we as independent prescriber are working within our scope of practise and acted in line with the HCPC and the Society of Chiropodist and Podiatrist guidelines.
Aim: Patients admitted to hospital with emergency diabetes foot complications can have a long length of stay (LOS). The unique role of the in-patient Diabetic Foot Practitioner (DFP) has been implemented to improve patient LOS. The aim of this study was to compare LOS of patients admitted with emergency diabetic foot complication from Accident and Emergency (A&E) with those admitted from the Diabetic Foot Clinic (DFC) and possible impact of the DFP.

Method: A retrospective review of patients admitted to hospital via A&E and DFC over a four month period (April-June 2016) with a with an emergency diabetic foot complication who were referred to DFP. We compared patient demographics, LOS, patient parameters (C-Reactive Protein (CRP), White Cell Count (WCC), and Estimated-Glomerular Filtration Rate (eGFR)), and duration of referral time to DFP between the two groups.

Results/Discussion: We included 53 patients with a total of 59 admission episodes over the four-month period. There were 42/53 males (79%) and 43/53 (81%) with type 2 diabetes; 33/59 (56%) were admitted from DFC and 26/59 (44%) from A&E. The patients admitted via A&E had a significantly longer LOS, 35±33 days (Mean SD) (Median 20days) vs 21±18days (Median 15days) for those admitted via DFC [p=0.042]. The CRP was significantly higher in the A&E cohort 147±105mg/L (Median 116mg/L) vs 73±68mg/L (Median 57mg/L) in the DFC cohort [p=0.002]. The WCC was significantly higher in the A&E cohort, 12±4 10ˆ9/L vs 9±4 10ˆ9/L [p=0.006]. The eGFR was significantly lower in those admitted from A&E, 48±30mg (Median 42mL/min) vs 64±27mL/min (Median 69mL/min) [p=0.036]. Of those referred to the DFP, they were referred within a similar time interval, 84% of each group was referred within 24hrs of admission, 27/32 for DFC and 21/25 for A&E. Indicating a similar involvement of the DFP in both groups.

Conclusion: Those patients referred to DFP from A&E had significantly longer LOS, increased CRP and WCC, and lower eGFR compared to those referred from DFC. Patients with diabetic foot complications require universal, rapid, open access to Diabetic Foot Clinics. This should prevent presentation with advanced pathologies at A&E which result in longer LOS.
Aim: To analyse the outcomes in patients with chronic mid-foot plantar ulcer in Charcot foot who underwent a plantar exostectomies.

Method: A retrospective study involving 15 patients with a mean age of 59.50 ± 17.13 years. 9 patients (60 %) were male and 6 (40 %) female. DM duration median was 16.50 ± 10.63 years. Body mass index (BMI) median was 28 ± 4.60 Kg/m² and average of Hb1Ac was 7.81 ± 2.32 %. All the patients had Charcot foot pattern III. 8 (53.3%) had nephropathy and 8 (53.3 %) retinopathy. An exostectomy was performed when conservative care failed or when the deformity was unable to be offloading. In 11 patients (73.3%) the exostectomy was performed in the lateral column and in 4 patients (26.7%) in the medial one. After completed healing patients were treated with customized insoles and therapeutic footwear with rigid rocker sole. Recurrence of mid-foot plantar ulcer, Charcot reacute process, minor and major amputation, and exitus were recorded in all patients.

Results/Discussion: 13 patients (86.6%) healed in a mean time of 24.5 ± 12.87 weeks. The median follow-up of the patients was 48.21 months [IR 12.35-73.75]. 4 patients (30.7%) suffered a recurrence of mid-foot plantar ulcer in a mean time of 10.5 ± 5.80 months, all of them located in lateral column. There was not an acute Charcot foot process during the follow-up period, neither minor amputation. 2 (15.4%) major amputation were suffered, due an acute ischemia process 12 months later, and due a necrotizing soft tissue 42 months later. These complications of the adverse event had no relation with surgical procedure. 1 (15.4%) of them died 24 months later. Other patient died 40 months later of healing ulcer due to ischemic stroke. Thus, 6 patients (40 %) did no suffer any event after exostectomy.

Conclusion: Reulceration rates in patients who underwent plantar exostectomy are lower compared to patients undergoing other surgical procedures. The most severe complications, major amputation and died, occur later and are not related to the surgical process. Plantar exostectomy is a safe and effective technique for the treatment of recurrent Charcot foot ulcers.
Aim: Charcot foot deformity is a severe complication of diabetes and a significant risk factor for ulceration, but minimal data on footwear efficacy and ulcer recurrence is available. The aim was to analyze plantar foot pressures, footwear adherence and ulcer recurrence in diabetic patients with a Charcot foot deformity.

Method: Data from a previous footwear trial was used to compare 21 diabetic patients with a midfoot Charcot foot deformity and ulcer history, to 150 diabetic non-Charcot patients with ulcer history. Barefoot and in-shoe plantar pressures were measured at trial entry and footwear adherence was measured over 7 days as percentage of steps that prescription footwear was worn. Ulcer recurrence was assessed at 18 months.

Results/Discussion: The Charcot group showed significantly higher median [1st QR, 3rd QR] barefoot and in-shoe peak pressures in the midfoot region (756 [234, 1274] and 149 [115, 200] kPa) compared to the non-Charcot group (137 [93, 197] kPa and 120 [95, 143] kPa, respectively). Other foot regions showed significantly lower plantar pressures in the Charcot group. The Charcot patients were significantly more adherent (95 [82, 98]% vs. 78 [55,92]%), especially when being at home (94 [86, 95]% vs. 68 [27,89]%). No significant differences were found in ulcer recurrence between groups: 42.9% in Charcot vs. 41.3% in non-Charcot, but relatively more midfoot recurrences were found in the Charcot group.

Conclusion: Although Charcot patients wear their prescribed shoes and generally show low in-shoe peak pressures, ulcer recurrence is not lower than in non-Charcot patients. A higher midfoot plantar pressure in the Charcot group may explain the higher rate of midfoot ulcer recurrence. Further optimization of custom-made footwear seems indicated, in particular in the midfoot region.
EPIDEMIOLOGY AND EARLY MANAGEMENT OF ACUTE CHARCOT FOOT IN A TERTIARY DIABETIC FOOT CLINIC IN BELGIUM

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**Aim:** Charcot foot is a rare complication of diabetes mellitus, associated with nonspecific inflammatory symptoms and progressive fragmentation of bones and joints. Diagnosis and management is often challenging, resulting in delayed treatment and devastating deformation. This retrospective study aimed to determine how acute Charcot foot occurs and is managed in our diabetic foot clinic.

**Method:** From 2004 until 2016, our centre registered 53 Charcot foot attacks using the IQED-foot registration procedure. Diagnosis and other variables were cross-checked using the electronic medical files. Data on initial occurrence and treatment were investigated, during an average follow-up period of 13.5±7.6 months. Of these 53 cases, 6 were still under follow-up, 6 were lost to follow-up and 7 consulted once for a second-opinion. For statistical analysis, missing values were excluded.

**Results/Discussion:** Peripheral neuropathy was present in all patients with an electromyography (n=26). Monofilament testing revealed that 42(91.3%) patients had loss of protective sensation. Although no peripheral arterial disease (PAD) was detected, mild arterial obstruction was observed in 2 cases after 7 months of first consult. Additionally, 3 patients were revascularised before the attack. 15(29.4%) subjects underwent surgery (n=19) on the affected foot during the 12-month period before diagnosis, mainly being minor amputation (n=10) and surgical debridement (n=5). Deformation was already present at first visit in 41(78.8%) cases and 23(56.1%) of these had the typical Rocker bottom foot deformity. Presence of this deformity was associated with a significant longer existence of Charcot related symptoms compared to absence of deformity (median 9 vs. 3 weeks, p<0.05). Regarding treatment, immobilisation by total contact casting (n=40) for a duration of 11.9±4.9 weeks is the standard of care. Subsequently, 25(55.5%) patients were treated with a below-knee orthosis, resulting in a total immobilisation period of 28.9±17.3 weeks. As confirmed by literature, peripheral neuropathy and absence of PAD are well-known predisposing factors. Furthermore, previous surgery plays a possible role in its pathogenesis, since approximately 1/3 underwent foot surgery.

**Conclusion:** Charcot foot patients often present with gross deformation. Early treatment remains challenging. Introducing an educational program could be a future plan to raise awareness among patients, first-line and second-line care providers.
Aim: To provide data on hospitalization, incidence rates of Charcot neuroarthropathy (CN) and its relation to lower limbs' amputations/revascularizations in population with diabetes in Tuscany.

Method: Hospitalizations with CN diagnosis (codes ICD-9-CM: 7130, 7135, 7138) have been recorded in people with diabetes 2008-2015 in Tuscany. Amputations, peripheral vascular disease, revascularizations and infections were likewise evaluated.

Results/Discussion: In these years CN hospitalizations were very infrequent: they were in 2008 14.1 x100,000 patients with diabetes, 22 x100,000 in 2012 and in 2015 reduced to 7 x100,000 patients (p=NS). Yearly CN incidence declining in Tuscany to a minimum of 3.4 x100,000 diabetic patients in 2015 (p=0.047). CN patients were younger and with longer length of hospital stay than those with non-Charcot diabetic foot (p<0.05). Amputation and infection rates were higher in CN patients than in those with non-Charcot diabetic foot, while the revascularization rate was similar in both.

Conclusion: Over last decade, in Tuscany yearly CN incidence and hospitalization rates concerned only a small percentage of patients, remaining very infrequent and declining in Tuscany in the last couple of years. CN was significantly associated to younger age, longer hospital stay and greater risk of amputations and infections, while the need of revascularization was similar to that ulcers of non-Charcot diabetic foot.
Aim: Charcot foot is a severe complication to diabetes mellitus and is associated with diabetic neuropathy. However, any possible long-term effects of a Charcot foot on the progress of neuropathy are still largely unexplored. Our objective was to investigate whether a previous Charcot foot had any long-term effects on somatosensory or autonomous neuropathy.

Method: An 8.5-year follow-up case-control study of 49 individuals with diabetes mellitus, 24 of whom also had Charcot foot at baseline visit in 2005-2007. Neuropathy was assessed with biothesiometry, heart rate variability and venous occlusion plethysmography.

Results/Discussion: Of the 49 participants, 22 were able to participate in the follow-up, while 12 had passed away in the meantime. Of the 22, 11 had previously had a Charcot foot, while another 11 were from the control group with diabetes without Charcot foot. The participants at follow-up was on average 69 years old, diabetes duration was 27 years with a HbA1c of 59 mmol/mol. There were 7 with type 1 diabetes and 17 with type 2 diabetes.

Somato-sensory neuropathy was measured by biothesiometry and showed no difference between baseline (39.1 Hz) and follow-up in the Charcot group (38.5 Hz) (p=0.946), while there was a significantly worsened sensitivity in the control group (from 25.1 to 38.9 Hz) (p=0.002).

Heart rate variability was unchanged in both groups; from 9.7 beats/min to 7.2 beats/min (p=0.053) in the Charcot group, and 14.3 beats/min to 12.6 beats/min (p=0.762) in the control group. In the Charcot group there was an expected decrease in blood-flow in the Charcot foot from baseline to follow-up (p=0.003), while in the control group there was no difference between the visits (p=0.272).

Conclusion: While baseline measurements showed a difference in both somatic sensitivity and blood-flow, we found that any differences in somatic or cardial autonomic neuropathy present at baseline had disappeared at follow-up.

Regarding blood-flow, this normalisation seems to be due to a complete normalisation of blood-flow to the previously acute Charcot foot. Regarding somato-sensory and cardial autonomic neuropathy, it seems to be due to the control group becoming more affected by neuropathy, and not the Charcot group recovering any sensitivity.
**Aim:** Our study focused on evaluating the outcome of one year treatment (OYT) in patients with active Charcot neuropatic osteoartropathy (ACN).

**Method:** Retrospective survey included 32 patients (mean age 61 ± 10 ys, 87% males, 90% T2DM, DM duration 13± 8 ys) with ACN examined at our foot clinic in 2010-2016. According to severity of clinical condition of foot at first presentation we divided the patients into 3 risk categories: 1. no deformity with or without ulcer, 2. deformity without ulcer, 3. deformity with ulcer. We evaluated OYT according to whether the illness developed from active to non-active stage, NACN (defined as absence of edema and redness, decrease of temperature difference below 2°C, bone healing in X-ray), or whether the activity persists, or if occurred complications requiring surgical treatment. We evaluated relation between OYT and demographic and clinical parameters (risk category of foot, adherence to offloading, time between first symptoms and examination, osteomyelitis).

**Results:** We confirmed statistically relevant relation and tendency between risk category of foot at first presentation and OYT (the higher category, the higher risk of complications, p=0.039). An important predictor of persisting CN activity or surgical treatment is osteomyelitis (p<0.001), while we did not prove a significant relation between clinical parameters (age, duration and type of DM, HbA1C) and OYT. Many patients treated by off-loading showed no progression (p<0.001). After one year of conservative treatment the disease turned into NACN in 25/32 (78%) patients. The ACN persisted, or complications requiring surgical treatment occurred in 7/32 (22%) patients. The average duration of ACN symptoms until the first presentation at the foot clinic was 3.6 months. The average period to decrease the skin temperature was 19.6 weeks. In 7/32 (22%) patients, development of ACN was preceded by overloading the limb in course of DFU treatment of the contralateral limb.

**Conclusion:** Predictors of ACN persisting one year and complications requiring a surgery were a deformity and foot ulcer at the first presentation and osteomyelitis. To prevent destruction of foot due to ANC necessitates regular education of high-risk diabetic patients and reliable interdisciplinary collaboration of specialists in the field.
SUDOMOTOR EXAMINATION SHOULD BE REGULARLY PERFORMED IN PATIENTS WITH CHRONIC KIDNEY DISEASE FROM PREDIALYSIS STAGE (CKD4) BUT ALSO AFTER TRANSPLANTATION TO DETECT NERVE REGENERATION

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Aim: The aim of this prospective 5-year study was to examine the incidence of foot morbidity among diabetic and non-diabetic patients in different stages of chronic kidney disease (CKD).

Method: During the preceding 5 years were enrolled: 108 diabetic patients [(18 with type 1DM); 25 with GFR 30-59 mL/min /1.73 m² (G1); 27 on HD (G2b); 56 with GFR ≥90 mL/min/1.73m² (G3b)], 35 with nephroangiosclerosis on HD (G2a); 30 with other causes HD (G2c); and 26 transplant recipients (G3a). Before 5 years, we performed: Neuropathy Disability Score (NDS) plus a diagnostic Test for Sudomotor Dysfunction and Early Detection of Diabetic Foot Syndrome, Diabetic Neuropathy* (evaluated as time to total colour change), colour doppler and detection of ulcer and/or amputation. Of the entire 199 patient population, 79 had meanwhile died.

Results/Discussion: Five-year mortality rates were: 68% in G1; 57.1% in G2a; 70.4% in G2b; 36.7% in G2c; 3.84% in G3a; 19.6% in G3b (p<0.01). Patients in G1 were older (71.12±7.8 years) compared with G2b (60.3±13.1 years) and G3b (59.9±7.75yrs) (p<0.01). Comparing G2a vs. G2b among those who had died, male sex was more prevalent among diabetic patients, (45.7 vs. 70.4%, p<0.05); duration of HD was shorter in diabetic patients (5.2±2.5 vs. 4.6±2.5 years, p=0.03). Prevalence of arterial hypertension in G1 vs. G2b vs. G3b was: 13(52%) vs. 26(96.3%) vs. 9(16.1%) (p<0.01) and duration of diabetes was 17.9±6.2 vs. 23±10 vs. 15.9±7.8 years (p<0.01). Among those who had died, abnormal NDS was without significant differences. However, the time until color change for the diagnostic test for Sudomotor Dysfunction and Early Detection of Diabetic Foot Syndrome, Diabetic Neuropathy* was: G1 8.9±5.8 min., G2a-c 26.8±8.2min., G3a 9.1±7.6min., G3b 11.3±7.4min. (p<0.01). Peripheral arterial disease among dead patients was: G1 8(47.1%), G2b 15(78.9%), G3b 7(63.6%). Ulcerations and/or minor amputations were present in G2b 5(18.5%) and G3b 13(23.2%). Major amputations were: 1 in G1, 1 in G3b and 6 in G2b(HD+DM) (p=0.003).

Conclusion: Category 3 diabetic foot (IWGDF) is exclusively seen in diabetic patients, on HD or not. Categories 1 and 2 may be present even in non-diabetic patients. We recommend prospective monitoring of sudomotor dysfunction from CKD stage 4 onwards. This dysfunction is strongly associated with end-stage diabetic foot pathology but also with end-stage renal insufficiency, regardless of the presence of diabetes.

*Neuropad
Aim: To assess the relationship between the development of peripheral neuropathy and wound healing rate in rats with streptozotocin-induced DM.

Method: The study was performed in rats, diabetes was induced by an injection of streptozotocin in 0.1 M citrate buffer in a dose of 65 mcg/kg. In control group an injection of 0.1 M CB was performed. 42 days later, the wound on the rats’ back was inflicted. The observation of wounds lasted for 8, 16 or 24 days. DM rat group received therapy with insulin detemir 1 IU/kg/day. The development of neuropathy was assessed by the pain test every 7th day. The wound’s area was measured every 3rd day. Skin samples were taken at 0, 8, 16 and 24 days of wound healing. The samples were stained with hematoxylin and immunohistochemical staining on β2 – adrenergic receptors (β2-AR) and Ki67 was conducted.

Results/Discussion: To 42 day of DM the time of withdrawal of the tail in rats with diabetes has almost doubled in comparison with the group of CB (p<0.05), which allows to establish the presence of sensory neuropathy. At the same time, a significant gap in the rate of wound healing in the group of rats with DM was noticed. According to the results of histological staining it was found that the intact skin was the same in all groups. On 8 day after modeling of the wound in the region of the edges of the wound, the expression of Ki67 was significantly less than in intact areas (p=0.004). On the 16th day, the expression of Ki67 in the area of the wound increased and did not differ from the remote areas of the skin. On the 24th day, Ki67 staining was again significantly weaker in the edges. The density of β2-AR in diabetic group at the wound edge was lower than in intact areas.

Conclusion: STZ-induced DM in rats is accompanied by development of peripheral neuropathy and a decrease in the rate of wound healing. According to immunohistochemical analysis, time and zone factors were significant for Ki67 expression, and only time factor was significant for β2-AR expression.

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Aim: The diagnostic utility of the portable device for automated nerve conduction study (NCS) of the sural nerve has been mainly evaluated in patients with type 2 diabetes mellitus (T2DM). Therefore, the aim of the present study was to examine the performance of this device in the diagnosis of peripheral neuropathy among patients with type 1 diabetes mellitus (T1DM).

Method: We included 46 T1DM patients (26 men) with mean age 36.8 years and mean T1DM duration 14.5 years. Exclusion criteria were B12 depletion, alcohol abuse and other causes of peripheral neuropathy. The reference method was the Neuropathy Disability Score (NDS) with a threshold NDS≥3. Sural nerve automated NCS was carried out with the portable device*. Nerve conduction velocity and sensory nerve action potential amplitude were measured bilaterally. Automated NCS was dichotomously considered as normal or abnormal: abnormality was present when ≥1 of the two aforementioned neurophysiological parameters were outside normal range in at least one leg.

Results/Discussion: Examination with the portable device* yielded 95% sensitivity, 92.3% specificity, 86.4% positive predictive value (PPV) and 96% negative predictive value (NPV). Positive Likelihood Ratio (+LR) was 12.3 and negative Likelihood Ratio (-LR) was 0.05. Youden’s J index was 0.873.

Conclusion: Sural nerve automated NCS with the portable device* exhibits high sensitivity and specificity for the diagnosis of peripheral neuropathy in T1DM, similar to its performance in T2DM.

*NC-stat® DPNCheck™ device (Neurometrix, Inc., Waltham, MA, USA)
Aim: Before 2005, there were no foot clinics and no education for podiatrists in Palestine. More than 20% of Palestinians were diabetics. To start up a diabetic foot clinic was great desire in this region because of the severe late complications. However, there were no resources nor knowledge how start-up. 2005 the Danish Church Aid and especially World Diabetes Foundation started a 5-year program. 2 Danes did the set up for this: Mrs. Kirsten Larsen and Dr. Torsten Deckert.

Method: The head of the Diabetic Foot Clinic contacted all health Care Centers in the West Bank and made agreements for calling patients and cooperators. Denmark sent a team of podiatrists’ volunteers to Augusta Victoria Hospital. Only a clinic of 10 square meter with nurse, Dietician, Laboratory Technician and a leader of the diabetic Clinic. They treated patients from West Bank and Gaza. The team went to villages and did home visits all over the West Bank. In 2014, mobile clinic was established for screening and treatments. This mobile clinic include eye-clinic and minor possibilities for making insoles etc.

Results/Discussion: 2016 the Diabetic Foot Clinic has grown to separate building with 290 square meters. It contain 11 rooms, toilettes and reception. The staff are 14 persons. They do Screening the Palestinian population, diagnoses, making gait analyses, treatment of big ulcers, measuring toe blood pressure, make bracelets for in-growing toenails, making insoles, making individually therapeutically shoes. Teaching patients concerning self-care and dressing for families. Established specialized foot care services in the Palestinian health care system. There are Training programs for nurses from the West Bank areas as well as from Gaza.

The team goes to Marathons with the mobile clinic to be an emergency-clinic. The diabetic foot clinic cooperate with education-organizations*. Statistics will be shown in the lecture.

Conclusion: The clinic has grown from level zero to a very highly specialized center for knowledge and experience center in the region. Training of Palestinian professionals on foot care and support the Palestinian health care system in providing high standard level of diabetic foot care.

*like University of Copenhagen and Novo Nordic Denmark.
Aim: Diabetic neuropathic patients present with loss of sensation, burning or numbness in the feet with weakness in the lower limb. With an aging population lumbar spinal stenosis (LSS) is seen frequently in this age group and the signs and symptoms can mimic neuropathy and Health Care Practitioners need to differentiate patients presenting with Neurogenic Intermittent Claudication and Diabetic Peripheral Neuropathy (DPN).

Method: Patients referred to a Diabetic Foot Clinic for a comprehensive Diabetic foot assessment and risk categorized for DPN between Risk Category 0 to 3. The patient files were randomly pulled out from May 2015 to March 2017. Patients that presented with chief complaint of DPN, patients diagnosed with LSS and patients that were diagnosed with both 

Results/Discussion: 84 patient’s files surveyed (Mean age 68.6 (range 37-91 years; 60 males). 49 were diagnosed with DPN only on examination (67.6±13.4 years; 37 males) and 29 (34.5%) had both LSS and DPN (70.9±9.3 years; 23 males) (p=NS). There was no difference in risk categories between groups.

Conclusion: LSS is very common occurrence in patients with diabetes and neuropathy and may be a confounding factor in the diagnosis and management of these patients especially as LSS can mimic DPN; although the severity of presentation is similar for both groups. Currently there is no treatment available for DPN but patients with LSS can benefit from appropriate physiotherapy and surgery and patients. Therefore patients with DPN and LSS will have a better quality of life if timely diagnosis is made.
Aim: To estimate the percentage of foot ulcer recurrence among diabetic patients attending Assiut diabetic foot care clinic and identify early predictors for its occurrence to establish targets for the prevention of reulceration.

Method: It was a prospective study, in which patients attending Assiut diabetic foot care clinic which was established in 2010 after participating in step by step project, and now receive many cases with different foot lesions and treat all levels of foot care. Presented with primary healed ulcer were followed until ulcer recurred maximally for 2 years, then they were divided into 2 groups: group with recurrent ulcers and group with non-recurrent ulcers to evaluate potential predictors of reulceration between May 2013 to July 2016. Multiple logistic regression analysis was used to identify independent predictors.

Results: The study included 93 patients out of 121 (23 patients lost in the follow up period and 5 patients died), all included patients were with type 2 diabetes. 49 (52.7%) were females, mean age was 51.73 ± 14.45 years. 57/93 (61.2%) patients had recurrent ulceration, of which 43 (75.4%) occurred in the first year. Characteristics of recurrent ulcers were 38/57 (66.6%) in the same foot, 19/57 (33.3%) were in the forefoot, 16 (28.1%) were infected, 39 were neuropathic, 11 neuroischemic and 7 ischemic ulcers. Predictors of ulcer recurrence were heavy smoking (p value 0.007), longer duration of diabetes (p value 0.005), presence of large fiber neuropathy and lost ankle reflex (p value 0.001, 0.0001 respectively), limb ischemia (p value 0.0001), HbA1c ≥ 10 and LDLc ≥ 110 (p value 0.009, 0.02 respectively).

Conclusion: Despite arising number of diabetic foot ulcers healed conservatively, the rates of ulcer recurrence are very high. Lost ankle reflex and limb ischemia were considered as independent predictors of ulcer recurrence. Another important issue is the lack of therapeutic footwear and proper foot care in our locality.
Aim: The main purpose of this study was to examine if there are differences within the commonly reported neurological and biomechanical parameters along with patient demographics, their life style profile and other clinical assessment in patients with and without neuropathy.

Method: 2371 (M/F: 1351/1020) diabetic patients; of whom 1255(M/F: 698/227) with neuropathy and 1116 (M/F: 653/463) without neuropathy who attended the diabetic foot clinic in Tanzania between Jan 2011 and Dec 2015 were recruited to participate in this study.

A combination of categorical and continuous data were collected from the patients during a single visit. A Chi-square test for independence with Yates Continuity Correction was utilized to identify significant (p<0.05) association between categorical parameters and diabetic foot neuropathy. Given that the data was not normally distributed (Kolmogorov-Smirnov, p<0.05), Mann-Whitney U Test was utilized to assess the significant (p<0.05) differences between the patients with and without diabetic neuropathy.

Results/Discussion: The results show that the diabetic neuropathy group showed a significant (p<0.05) association with the following: assistive devices ($\chi^2=5.368$), history of smoking ($\chi^2=6.211$), history of alcohol consumption ($\chi^2=28.656$), history of previous ulceration ($\chi^2=7.804$), presence of callus ($\chi^2=8.158$), active ulcer ($\chi^2=41.411$), and ulcer location ($\chi^2=43.764$), touch sense sensitivity ($\chi^2=612.489$), abnormal MTP Joint range of motion ($\chi^2=26.316$); abnormal ankle range of motion ($\chi^2=25.543$); skin fissures ($\chi^2=10.129$); mycosis ($\chi^2=14.099$); nail ingrowth ($\chi^2=4.824$); swelling ($\chi^2=20.994$), future ulceration ($\chi^2=16.152$).

Mann-Whitney U test revealed significantly (p<0.05): lower Ankle Brachial Index (U=627867.0) with small effect size, higher Vibration Perception Threshold (U=304013.0), lower cool sensitivity (U= 301069.0); higher heat sensitivity (U= 295984.0); lower cold pain threshold (U= 295172.5) and higher heat pain threshold (U= 290947.5) all with a large effect size. Further the regional plantar pressure at different sites were significantly higher during walking for the patients without neuropathy when compared to their neuropathic counterparts.

Conclusion: The results of this study indicates that the neuropathic group show significant differences in the foot related characteristics against their non-neuropathic counterparts. This can have implications in designing a group-specific protocol that can best accommodate the needs of patients.
Aim: Approximately 1.9% of the Kenya population lives with diabetes with about 1 case in every 4 newly diagnosed cases being undiagnosed. Foot care remains a neglected area in provision of quality diabetes care during routine annual check-up. Thus, we sought to assess the risk of diabetes foot complications among type 2 diabetes patients in Kenya to highlight the need for improved foot care.

Method: A descriptive cross-sectional study design was adopted. A total of 149 diabetes patients were screened for their risk of foot complications using the New Zealand Foot Stratification criteria. A systematic random sampling was used to select the participants. The study was conducted in Mathari National Hospital, Kenya. The study was approved by the Ethics and Research Committee of the Kenyatta National Hospital and University of Nairobi.

Results/Discussion: Out of 149 participants, 19.48% had good glycaemic control < 7% with (48.8%, 40.2-56.4) having active risk, 24.2% (17.2-31.1%) had high risk, 26.2% (19.0-33.3%) had moderate risk and 1.3% (-0.5-3.2%) had low risk. There was no significant association between glycaemic control and the risk of foot complications. Among those with active, high and moderate risk of foot complications, 77.8%, 75% and 89.7% had poor glycaemic control respectively. Majority of the women had active (50.5%) and high (24.3%) risk of foot complications while most of the male participants had high proportion of active (43.5) and moderate (28.3%) risk of foot complications. More than half (53.6%) of the older population had a high proportion of active risk of foot complication while 50.9% of the active risk was among the 45-54 years’ age group. 85% of the participants have never been screened for feet complications.

Conclusion: The foot risk classification has been fronted as an effective tool to prevent lower-extremity complications of diabetes. The practice of screening of foot is poor in Kenya and efforts should be put in place to routinely screen patients for diabetes foot complications. Health care professional and patients should also be sensitized on the importance of foot screening to prevent lower-extremity complications. Moreover, HCPs should work with patients to promote good glycaemic control.
IMPLEMENTATION OF A JOINT DIABETES RENAL MICROBIOLOGY MULTIDISCIPLINARY TEAM IN PATIENTS WITH DIABETIC FOOT DISEASE RECEIVING DIALYSIS

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Aim: Diabetic foot disease (DFD) and lower extremity amputation are considered to be 10 times higher in diabetic individuals receiving dialysis. Furthermore, they have disproportionately high rates of foot-related hospital admissions. Those on dialysis often lose contact with care outside the dialysis units and access to foot care is limited in dialysis units. Thus, interventions and strategies aimed at reduction of DFD burden in dialysis patients are important. We report on our joint diabetes-renal-microbiology multidisciplinary team (JDRMDT), set up to address the challenge and facilitate cross specialty care.

Method: Retrospective analysis of all the patients discussed at the JDRMDT meetings over a 24 month period. Patients were reviewed by the acute foot team while undergoing dialysis with liaison and referral to the hospital multidisciplinary foot unit when required. A summative team discussion was held at the end of each week comprising of a podiatrist, diabetologist, nephrologist and microbiologist to update and address any concerns. The analysis was limited only to those with active DFD mandating closer surveillance.

Results/Discussion: We discussed 37 patients with an average age 65±12 years (mean±SD), males 51%, with active DFD. Duration since dialysis start was 3.5±3.1 years. In 24/37 (67%) patients there was evidence of significant peripheral vascular disease; they underwent 2.3±2.1 revascularisation procedures. There were 14 (38%) minor amputations (13/14 had CLI) and 4 (11%) major amputations (all had CLI). Microbiology was predominantly polymicrobial (44%) with gram-negative organisms predominating although pure MSSA (17%), MRSA (21%) VRE (10%) were also noted. Overall, 8/37 (22%) died during this period with a higher (50%) mortality observed among those with major amputations. While emergency hospital admissions were 6.0±5.1 episodes/patient; only 1 ±1.25 episodes/patient were foot-related.

Conclusion: We found that the JDRMDT was an effective way of bridging the care gap in diabetic foot patients receiving dialysis. It allowed for complex diabetic foot care within the dialysis unit mitigating the need for multiple outpatient visits and demonstrated encouragingly low foot-related hospital admissions. In addition, our observed major amputation rate was lower than reported in literature. Such an initiative may represent major quality of care and cost benefits.
Aim: Patients with a history of diabetic foot ulcer have a higher risk for re-ulceration, amputation or re-amputation and a significantly decreased quality of life and increased mortality. We aimed to investigate the rate of foot related complications and mortality in a high-risk population of patients with diabetic foot syndrome.

Method: 91 patients with recently healed foot ulcers (age: 65 ± 11 years, gender: 44 women and 47 men, 6 with diabetes type 1, 85 with diabetes type 2, mean BMI 28.5 ± 4.4kg/m2 and HbA1c 8.4 ± 1.6% (68.1 ± 17.3 mmol/mol) were included. 91 patients had clinical signs of neuropathy, 42 had clinical signs of peripheral artery disease (PAD), 25 a history of minor amputation, 5 had a major amputation, 40 had clinical signs of nephropathy, and 53 of retinopathy.

Results/Discussion: 33 patients completed the observation time of 11.0 ± 0.6 years and 58 patients died during this follow-up period. Causes of death were cardiovascular events in 62.1%, infections in 20.7%, cancer in 6.9%, renal causes in 1.7% and 1 patient committed suicide. In 6.9% the cause of death was unknown. 71 of the initial 91 patients showed re-ulceration, mean time of first ulcer recurrence was 1.8 ± 2.4 years, 21 patients had an amputation, which included 19 minor and 2 major amputations and mean time to amputations was 3.6 ± 1.9 years. In patients with an initial minor amputation, 3 major amputations were required over the follow up time. PAD was significantly predictive for a composite of amputation or death (p<0.01).

Conclusion: Resulting data highlights the high recurrence rate of ulcerations and increased mortality in patients with diabetic foot syndrome and identified PAD as major predictive risk factor for amputation or death. Cardiovascular risk factors should be addressed in this high-risk population.
Only 23% of diabetic foot infections needing acute hospital admission could be classified as severe based on current guidelines on temperature, pulse, respiration and white blood cell count.

**Aim:** International guidelines indicate that that diabetic foot infection can only be classified as severe when patients present with a systemic inflammatory response syndrome (SIRS ) as manifested by 2 or more of the following features: Temperature >38°C or <36°C, Heart rate >90 beats/minute, Respiratory rate >20 breaths/minute, White blood cell (WBC) count >12.0 $10^9$L or <4.0 $10^9$L. This study reports that only 23% of diabetic foot infections needing admission to hospital could be classified as severe if current guidelines on temperature, pulse, respiration rate and WBC count are followed.

**Method:** We studied 30 patients who needed admission to hospital for treatment of diabetic foot infection. Clinical parameters (body temperature, pulse rate and respiratory rate) were recorded on the day of admission. Blood samples were also collected on admission and inflammatory markers were measured. Data are median (25th–75th percentile) values.

**Results/Discussion:** The median plasma C-reactive protein on admission was considerably raised at 160 (72-287) mg/l, reference range (rr) below 5mg/l. However, the median body temperature was only 37.2 (36.8 - 38.1)°C. The median pulse rate was 85 (80-95) beats/min and the median respiratory rate was 17 (17-18) breaths/min. The median WBC count was 12.4 (9.4-17.2) $10^9$L, rr 4.0 to 11.0 $10^9$L and the median neutrophil count was 10.3 (6.7-14.5) $10^9$L, rr 2.2-6.3 $10^9$L).

With reference to guideline criteria, only 6/30 patients had a body temperature >38°C and 0/30 patients had a body temperature <36°C; 7/30 patients had a pulse rate >90 beats/min and 0/30 patients had a respiratory rate >20 breaths /min; 13/30 patients had WBC >12.0 $10^9$L and 0/30 had WBC<4.0 $10^9$L. Overall, only 7/30 patients fulfilled the current definition of severe foot infection.

**Conclusion:** There is concern that diabetic foot infections which are serious enough to require hospital admission may not be classified as severe according to present guidelines and may not receive the urgency which they deserve. Guidelines on diabetic foot infection should be revisited.
Aim: The ischaemic diabetic foot is difficult to treat and the role of revascularization is not fully established. Our aim was to document the progress of diabetic patients who present with a foot ulcer and non-palpable pedal pulses over 6 months.

Method: We conducted retrospective analysis of consecutive new patients with ulceration and absent foot pulses. All patients had Doppler waveform assessment at common femoral, popliteal, anterior tibial, posterior tibial and dorsalis pedis arteries. All patients had multidisciplinary conservative treatment in the Diabetic Foot Clinic and outcomes of ulcer healing, major amputation, mortality and frequency of revascularization were recorded at 24 weeks (6 months).

Results: The patients were divided into four groups according to Doppler findings. Group 1 (n=8) had normal waveforms in the feet, 5 had infection and 3 were hindfoot ulcers: 3 healed, 4 unhealed (one was lost to follow up). Group 2 (n=11) had normal femoral waveforms but diminished popliteal and foot artery waveforms, 9 had infection and 4 were hindfoot ulcers: 6 healed, 5 unhealed, one had a femoral-posterior tibial artery bypass, one had popliteal-lateral plantar bypass, 2 patients had superficial femoral artery (SFA) angioplasty, 2 patients had tibial artery angioplasty and one patient had SFA and tibial-peroneal trunk angioplasty. Group 3 (n=5) had normal femoral and popliteal waveforms but reduced foot artery waveforms, 3 were infected and 2 were hindfoot ulcers: 3 healed, one unhealed (one lost to follow up). There was one angioplasty of anterior tibial artery. Group four (n=2) had abnormal femoral, popliteal and foot artery waveforms, one had infection and one was a hindfoot ulcer: both were unhealed and one had iliac angioplasty. Overall, 12/24 patients were alive and ulcer free at 24 weeks (6 months). Nine patients underwent revascularization, 7 receiving angioplasty and 2 bypasses. However, 10/12 patients healed their ulcers without revascularization. There were no major amputations or deaths.

Conclusion: Our patients underwent multidisciplinary management leading to 50% ulcer healing at 24 weeks (6 months). Although revascularization was performed in 38% of patients, it is important to note that 10/12 patients healed with conservative treatment alone.
Aim: The aim of this study was to characterize the patients that attended a first appointment at the multidisciplinary outpatient Diabetic Foot Unit of our institution during one year.

Method: A retrospective observational study was performed. Patients who were observed for the first time in our multidisciplinary outpatient Diabetic Foot Unit between January and December 2014 were reviewed (n=541). Patients with diabetic foot ulcer (DFU) and available data were included. We have analysed: demographic data, educational level, duration of diabetes, HbA1c, presence of neuropathy and peripheral artery disease, previous ulcers and amputations, clinical characteristics and management of DFU.

Results/Discussion: A total count of 305 patients was included. There was a slight predominance of men (56.7%), with a median age of 69.5 years old (32-93). They had been diagnosed with diabetes for a median of 15 years (0.5-55). The median of HbA1c was 7.7% (4.9-14%).

The majority of patients were under insulin treatment (54.8%). 78.9% of the patients had an education level equal or below the fourth year. 38.6% had had a previous diabetic foot ulcer and 24.4% had had a previous amputation. The presence of peripheral artery disease was 64.3%.

The majority of patients had a forefoot wound (70.3%), while hindfoot and midfoot ulcers had the same prevalence (12.3%). Probable osteomyelitis was present at least in 31.8%. 87 (28.5%) of these patients were hospitalized to receive intravenous antibiotics and/or surgical treatment of the wound. Only 36% of patients with peripheral artery disease underwent a revascularization procedure. 42 patients (13.8%) underwent amputation and 9 of these were major.

Conclusion: Diabetic foot ulcers were more common in older men and in individuals with low educational level. The majority of ulcers occurred in patients with neuroischemic foot and forefoot ulcers were predominant. Near one third of the patients had probable osteomyelitis.
Aim: Diabetes represents the leading cause in approximately 60% of non-traumatic lower limb amputations, which, together with renal failure and blindness, is one of the most feared consequences of diabetes. The aim of the study was to find predictive parameters for lower limb amputations among the diabetic foot cases admitted to a Diabetes Clinic during 1 year.

Method: We conducted a retrospective study on a group of 151 patients admitted to the Clinic of Diabetes, Nutrition and Metabolic Diseases, during 1 year. We considered all cases with diagnoses related to "diabetic foot", noting that, in patients with multiple admissions during the duration of the study, we collected data for the first admission. Data collected included socio-demographic factors, anthropometric parameters, data on diabetes, biological tests, descriptive elements of the lesion, osteolysis, cellulitis, duration of hospitalization and transfer into a surgical clinic for amputation.

Results/Discussion: A percentage of 54.3 of cases had cellulitis. Approximately one third of patients had osteolysis and a percentage of 34.4% of cases had a history of amputation. 35.8% of patients were transferred to a surgical clinic for amputation. The median duration of hospitalization was 14.28 days, with a maximum of 59 days. There were no statistically significant differences between men and women, with respect to the location of the lesion (p = .621), osteolysis (p = .746), history of amputation (p = .963) and transfer into a surgical clinic (p = .075), except for the presence of cellulite (p = .008). By using ROC curves and calculation of the area under the curve with a 95% confidence interval several parameters were tested in order to evaluate the predictive value for transfer in a surgical clinic to be amputated. Statistical significance was obtained for: CRP (p = .001), ESR (p = .000), fibrinogen (p = .000), white blood cells (p = .000), neutrophils (p = .000), osteolysis (p = .000), cellulitis (p = .025).

Conclusion: Among all cases of diabetic foot registered in our clinic during one year, the ones which necessitated amputation were those with higher inflammatory tests, with osteolysis and perilesional cellulitis.
Aim: The global rise in diabetes prevalence is associated with an increase in diabetes-related complications. Indonesia is in fifth position worldwide for cases of diabetes. Most diabetic foot amputations are the caused by ulcers. Early identification at high risk patient for diabetic foot ulcers (DFU) was a top priority due to the clinical and economic burden of diabetic foot complications. Indonesian Diabetic Society (PERSADIA) performs routine activities such as diabetes and leg exercises, health education, doctor’s consultation, training, and gathering. The activities are expected to support the achievement to control diabetes and prevent diabetic complications such as diabetic foot ulcers (DFU). This study aims to determine the stratification of risk factors for ulcers in patients with type 2 diabetes member of PERSADIA.

Method: This cross-sectional study was conducted on 150 participants PERSADIA Surakarta branch. There are 74 samples that met the inclusion criteria. Inclusion criteria: Patients with type 2 diabetes members of PERSADIA, at least one weekly doing foot and diabetic exercise. Exclusion criteria: patients with non-DM, psychosomatic disorders. Sample is screened foot with model of care for the diabetic foot National Diabetes program, Clinical Strategy and Programs Directorate, 2011, consists of a history of diabetes related foot complications, medical history and assessment of peripheral sensation*, the assessment of vascular, Ankle Brachial Index (ABI) and toe abnormalities.

Results/Discussion: There were 21 men and 53 women. 27 samples aged 40-60 year, there are 47 samples aged over 60 years. 5-10 years suffering from diabetes 40 sample. Users of oral anti-diabetic (OAD) 53 samples, Insulin 14, the combination of insulin and OAD only 7 samples, neuropathy found in 56 samples. 10 sample with ABI <0.9. 10 sample with a history of ulcers and amputations. The stratification result of risk factors: high (10 samples), moderate (37 samples) and low (26 samples).

Conclusion: Screening procedures and stratification in diabetic patients member of PERSADIA can be used as a reference for the prevention, consultation and prompt treatment of the complications of diabetes, including leg ulcers.

*Semmes Weinstein Monofilament 10 g
Aim: To identify variables affecting the quality of life of the caregivers of patients with DFU according to dependency level.

Method: Observational study, conducted at a Diabetic Foot Unit, which included 39 caregivers of patients with DFU. Barthel Index (1955) was used to assess the level of dependency in basic patient daily activities and the questionnaire* to identify the cares that the caregivers give to its relative patient and consequences that this caring activity have in his quality of life (conceptual framework of Virginia Henderson).

Results/Discussion: Average age of the caregivers was 58.87±14.63 years and 69.2% (n=27) were woman. Average time caregivers have spent with their relatives was 86.32±105.29 months, 76.9% (n=30) lived together with the patients and 41% (n=16) worked outside home. Average patient level of dependency was moderated [(Barthel: 70.33±22.27)]. Following table shows the distribution of the impact in the basic necessities of the caregivers and the carer characteristics that have impact on the carer life quality, depending of the level of dependency:

<table>
<thead>
<tr>
<th>Impacted necessities according to the carer perception</th>
<th>n</th>
<th>%</th>
<th>Total dependency (1 patient/2.6%)</th>
<th>Severe dependency (10 patients/25.6%)</th>
<th>Moderate dependency (22 patients/56.4%)</th>
<th>Low dependency (6 patients/15.4%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygenation</td>
<td>7</td>
<td>17.95</td>
<td>None</td>
<td>None</td>
<td>Illiteracy (p=0.05)</td>
<td>None</td>
</tr>
<tr>
<td>Nutrition</td>
<td>20</td>
<td>51.28</td>
<td>None</td>
<td>Female (p=0.011)</td>
<td>Work outside home (p=0.030)</td>
<td>Work partially outside home (p=0.013)</td>
</tr>
<tr>
<td>Elimination</td>
<td>10</td>
<td>25.64</td>
<td>None</td>
<td>Work partially outside home (p=0.035)</td>
<td>None</td>
<td>College degree (p=0.014)</td>
</tr>
<tr>
<td>Movement</td>
<td>27</td>
<td>69.23</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Rest and sleep</td>
<td>27</td>
<td>69.23</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Get dressed and undressed</td>
<td>7</td>
<td>17.95</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Hygiene and protection skin</td>
<td>12</td>
<td>30.77</td>
<td>None</td>
<td>None</td>
<td>Living with the patient (p=0.015)</td>
<td>Living with the patient (p=0.005)</td>
</tr>
<tr>
<td>Avoid dangers</td>
<td>11</td>
<td>28.11</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Communication</td>
<td>20</td>
<td>51.28</td>
<td>None</td>
<td>None</td>
<td>College degree (p=0.014)</td>
<td>Work partially outside home (p=0.014)</td>
</tr>
<tr>
<td>Work and personal fulfillment</td>
<td>24</td>
<td>61.54</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Recreation</td>
<td>34</td>
<td>87.18</td>
<td>None</td>
<td>Living with the patient (p=0.035)</td>
<td>Work outside home (p=0.034)</td>
<td>None</td>
</tr>
</tbody>
</table>

Conclusion: The impact on quality of life of caregivers of patients with DFU is highly altered. Caregivers of patients with DFU and severe dependency have alteration focused in physical health (nutrition/elimination/movement) and everyday life (learning). With moderate dependency in physical health (oxygenation/nutrition) psychological health (get dressed and undressed/hygiene and skin protection), everyday life (avoid dangers/recreation) and professional life (work and personal fulfillment). And with de low dependency in physical health (nutrition/elimination) psychological health (get dressed and undressed/hygiene and skin protection) and everyday life (avoid dangers/communication).

*Questionnaire ICUB97©
An 85 year old lady with end stage renal disease requiring haemodialysis and T2DM was initially referred to our multidisciplinary diabetic foot ulcer clinic with left hallux ulceration and abscess. X-ray confirmed distal phalanx osteomyelitis. The patient was treated with a six week course of oral antibiotics as per the local protocol. By 4 weeks the ulcer had resolved. She was discharged from the clinic with appropriate footwear and follow up care with the community podiatrist. 10 weeks later the patient was again referred to the clinic. She had developed a sharply punched, deep probing ulcer with purulent discharge at the same site. The X-ray showed further destruction of the terminal phalanx of the hallux. The purulent discharge didn’t grow any organisms. Skin swab grew *candida albicans*. It was thought to be a contaminant. She received a further course of oral antibiotics. Differential diagnosis of calciphylaxis, and uremic arthropathy were considered. The ulcer again healed completely 4 weeks into a 6 week course of oral Clindamycin but recurred at the end of antibiotics course. The repeat X-ray showed progressive destruction of left hallux distal phalanx. The patient was not keen for partial amputation of left hallux. Hence, she had a surgical debridement. Bone biopsy demonstrated an acute on chronic osteomyelitis. Microbiology cultures grew *candida albicans* from the infected bone as well as from the biopsy of the proximal phalanx. She was given 12 week course of oral fluconazole. The ulcer rapidly responded to oral fluconazole and healed. She was discharged from the foot ulcer clinic with no evidence of recurrence to date.

**Discussion:** *Candida albicans* osteomyelitis has been reported in immunocompromised patients including transplant patients. Candida species can be isolated from skins of normal healthy individuals and it is also known to colonise chronic wounds. Our patient had paronychia prior to ulceration and had Candida isolated from her hallux but it was thought to be a commensal. She had recurrent ulceration and progressive destructive osteomyelitis unresponsive to standard antibiotics. This case highlights the importance of consideration of mycotic infections in protracted diabetic foot ulcers.
[P74] INFLAMMATORY MARKERS HAVE PREDICTIVE VALUE ON THE OUTCOME OF DIABETIC FOOT OSTEOMYELITIS

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Aim: To analyze the utility of inflammatory markers on the outcome of diabetic foot osteomyelitis (DFO).

Method: A prospective observational study was performed in patients with clinically suspected DFO. The patients received surgical or medical treatment. Erythrocyte sedimentation rate (ESR), C-reactive protein (CRP) and white blood cells (WBC) were analyzed from the blood of 74 patients at DFO diagnosis, at ulcer healing and after 1 month from healing. As a follow-up study, patients were screened for DFO recurrence and ulcer recurrence for a month after ulcer healing.

Results/Discussion: Median time from ulcer was 13.1±21.7 weeks. The data of the inflammatory markers are showed in table 1.

<table>
<thead>
<tr>
<th></th>
<th>At DFO diagnosis</th>
<th>At ulcer healing</th>
<th>After 1 month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean±SD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N=74</td>
<td></td>
<td>N=74</td>
<td>N=74</td>
</tr>
<tr>
<td>Surgical management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n=64</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ESR 32.5±26.6mm/h</td>
<td>ESR 23.1±21.5mm/h</td>
<td>ESR 22.3±19.3mm/h</td>
<td></td>
</tr>
<tr>
<td>CRP 13.9±32.1mg/L</td>
<td>CRP 5.0±6.0mg/L</td>
<td>CRP 7.8±19.2mg/L</td>
<td></td>
</tr>
<tr>
<td>WBC 8.7±2.6x10³/µL</td>
<td>WBC 8.3±2.6x10³/µL</td>
<td>WBC 8.6±2.4x10³/µL</td>
<td></td>
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<tr>
<td>Medical therapy</td>
<td></td>
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<tr>
<td>n=10</td>
<td></td>
<td></td>
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<tr>
<td>ESR 27.2±32.6mm/h</td>
<td>ESR 23.1±17.2mm/h</td>
<td>ESR 28.8±19.5mm/h</td>
<td></td>
</tr>
<tr>
<td>CRP 27.1±72.1mg/L</td>
<td>CRP 4.1±5.1mg/L</td>
<td>CRP 3.3±3.8mg/L</td>
<td></td>
</tr>
<tr>
<td>WBC 7.6±1.4x10³/µL</td>
<td>WBC 7.8±2.0x10³/µL</td>
<td>WBC 7.4±2.0x10³/µL</td>
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</tr>
</tbody>
</table>

Table 1.

Significant differences were observed between the value of ESR (p=0.002) and CRP (p=0.024) at the beginning and when the ulcer was healed but no significant differences were found respect to WBC value (p=0.161). Two (2.7%) patients suffered DFO recurrence with elevated values of ESR (66mm/h and 74mm/h) and 1 with elevated value of CRP (13.9mg/L). Two (2.7%) patients suffered ulcer recurrence with normalized values of ESR and CRP.

Conclusion: Normalized inflammatory markers (ESR and CRP) are useful tools to predict absences of adverse events related to bone infection after short-term follow-up in patients who suffered DFO, after the ulcer healed regardless of the treatment administered.
The Total Contact Cast (TCC) has been described as the gold standard for off-loading ulcers but its usefulness in healing complex non-infected and infected diabetic foot ulcers has not been well established. The aim of this study was to demonstrate the value of TCC in healing not only non-infected diabetic foot ulcers but also clinically infected ulcers.

Method: The study was a retrospective review of consecutive patients, who were treated with non-removable TCC treatment for foot ulceration within our diabetic foot clinic over a 3 month period (June to August 2015). We excluded patients treated with complex casts (scotch cast boots, removable casts and windowed casts). We compared patients with infected ulcers to those with non-infected ulcers. Patient demographics, duration of ulceration before start of TCC, duration of TCC treatment and healing outcomes were compared between the two groups.

Results/Discussion: A total of 56 patients were included over the 3 month period. The mean age was 59±12 years; 80% were male. On initiation, 44/56 (79%) had non-infected ulcers and 12/56 (21%) had clinically infected ulcers. Mean duration of ulceration before the start of TCC was 15±7 weeks (Mean±SD) (Median 16 weeks) in the non-infected group vs 18±2 weeks (Median 13 weeks) in the infected group [p=0.327]. The duration of TCC was 26±23 weeks (Median 22 weeks) in the non-infected group vs 19±18 weeks (median 13 weeks) in the infected group [p=0.352]. Time taken to heal from the start of TCC was 17±15 weeks (median 13 weeks) in non-infected group vs 26±7 weeks (median 28 weeks) in the infected group. The time taken to healing from the start of ulceration was significantly reduced in the non-infected group at 20±15 weeks (median 18 weeks) vs 32±8 weeks (median 36 weeks) in the infected group [p=0.049]. There was no statistical difference in the percentage of ulcers healed between the two groups; 33/44 (75%) of patients in the non-infected group healed vs 7/12 (58%) of those in the infected group [p=0.253].

Conclusion: TCC can be successfully used to heal both infected as well as non-infected diabetic foot ulcers. The technique ought to be offered to more patients including those with clinical signs of infection.
[P76] CHALLENGES FACED IN MANAGING DIABETIC FOOT INFECTION CAUSED BY MULTIDRUG RESISTANT GRAM NEGATIVE ORGANISM IN OUTPATIENT SETTINGS

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Aim:

- To explore the antimicrobial resistance pattern of gram negative bacteria in diabetic foot infections (DFIs) in our diabetic foot service.
- To discuss the challenges in managing DFIs with multi drug resistant gram negative organisms (MDRGNO) in diabetic foot clinic.

Method: Laboratory and clinical data between 2010 and 2017 were reviewed retrospectively for MDRGNO from patients with DFIs.

Results/Discussion: In the last 7 years, 30 MDRGNO were identified from diabetic foot patients. 27 of these were Extended-spectrum β-lactamase (ESBL) organisms and 3 Carbapenem resistant organisms (CRO). The majority of isolates showed resistance to three or more antimicrobial classes including Beta-lactams (all Penicillins and Cephalosporins), Fluoroquinolones and aminoglycosides. These were resistant to all oral agents.

Bacterial resistance is a rising concern that is becoming increasingly common in healthcare settings. This increase raises serious concerns because multi drug resistant infections limit the choice of antibiotic therapy leading to the use of more IV agents, longer hospital admission and the potential for failure of empirical therapy.

The out-patient setting makes it very difficult to implement the same infection prevention measures as inpatient hospital settings. Management of diabetic foot infections includes not only antimicrobial therapy but also wound care, mechanical support and offloading. This represents a challenge in preventing the transmission of antibiotic-resistant bacteria between patients in a busy clinic. The CRO require rigorous infection prevention interventions including enhanced cleaning (including hydrogen peroxide viper), use of more specialised personal protective equipment (PPEs) and issues using radiology and casting facilities.

Conclusion: 30 cases of MDRGNO in 7 years is a small numbers but the complications and the challenges they raise are complex. There may be a need to adjust the empirical choice of antibiotics and more complex infection prevention interventions to deal with these cases in outpatient settings. This will be discussed in relation to specific cases which highlight these points.
HAEMATOLOGICAL EFFECTS OF LINEZOLID: A SURVEY OF OUR PATIENT EXPERIENCE

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**Aim:** Linezolid is an oxazolidinone antibiotic, active against Gram positive bacteria, and is very useful in the treatment of diabetic foot infections (DFI). It has the advantage of having excellent oral bioavailability and therefore parenteral antibiotic therapy can potentially be avoided in patients with resistant infections. However, amongst other side effects, Linezolid can cause reversible myelosuppression. The manufacturer’s datasheet recommends weekly full blood count (FBC) monitoring and a maximum treatment duration of 28 days. We aimed to see what effect Linezolid had on the FBC in our cohort of patients who were prescribed Linezolid for their DFI.

**Method:** We searched our electronic database for all patients who were prescribed Linezolid for their DFI from 1st January 2016 to 1st January 2017. Data was collected on duration of treatment, reason for stopping treatment and FBC monitoring whilst on treatment. We looked at the change in haemoglobin, white cell count, platelets and neutrophils week by week for each patient whilst on treatment.

**Results/Discussion:** Over the 1 year period, 41 courses of Linezolid were prescribed to 35 patients. 94% (33/35) were male and 94% (33/35) had type 2 diabetes mellitus. Indication for Linezolid was an infected foot ulcer in 93% (38/41) of cases, 1 case of paronychia and 2 cases of gangrenous toes. Mean treatment duration was 18.2±7.5 days. Linezolid was stopped in 1 patient due to falling platelets (252x10⁹/L to 131x10⁹/L). 3 patients stopped due to falls in both their haemoglobin and platelets. Most patients had a drop in platelets. Mean drop throughout treatment for all patients was 91x10⁹/L. After 3 weeks of treatment, the mean drop in platelets was 120x10⁹/L±83 x10⁹/L. 15% (6/41) developed thrombocytopenia (platelets < 150x10⁹/L). In patients who had 4 weeks of treatment haemoglobin fell by mean of 9.5g/L.

**Conclusion:** In our patients, after Linezolid treatment, a drop in platelets is observed more than other FBC parameters, similarly observed by others. Longer duration of treatment is also associated with greater severity of myelosuppression. It is therefore vital that patients are adequately monitored whilst on Linezolid and that results are acted upon in a timely manner.
Aim: To identify cases of fungal osteomyelitis in patients attending our multidisciplinary diabetes foot clinic over a 2 year period and to review the causative organisms and the required treatment. We also wanted to look at the degree of morbidity due to fungal osteomyelitis in regards to amputations and death.

Method: All patients seen in our multidisciplinary diabetes foot clinic have documentation entered with their consent into our local electronic database. We used the database to identify our cohort. We included patients with a diagnosis of diabetes mellitus and an episode of fungal osteomyelitis between January 2015 and December 2016. Osteomyelitis was diagnosed either clinically or radiologically. Fungal involvement was determined by either direct bone culture of fungal organisms or tissue culture of fungal organisms and specialist microbiologist input diagnosing fungal osteomyelitis. We also looked at gender, ethnicity, HbA1c, fungal organism, co-existing bacterial infection and need for amputation.

Results/Discussion: 18 patients with fungal infection were identified but only 8 had the specified above criteria. All the patients were male, 7/8 had type 2 diabetes mellitus and the other patient had type 1 DM. 7 patients were Caucasian and 1 patient was of Indian origin. Average HbA1c was 84.4 mmol/mol (46-110). 7 patients had co-existing bacterial infection and only 1 patient had isolated fungal growth. All patients with bacterial co-infection went on to have an amputation, whereas the patient with isolated fungal culture did not require amputation. All fungal species grown belonged to Candida genus with three individual species identified – C. Albicans, C. Tropicalis and C. Parapsilosis. All were sensitive to fluconazole which was used as the treatment of choice – 100 mg twice a day for the first day then 100 mg daily for 6 weeks.

Conclusion: Fungal infection often co-exist alongside bacterial infection in patients with diabetic foot ulcers. It is evident that fungi can also infiltrate bone and cause osteomyelitis. Patients with osteomyelitis treated with antibiotic therapy as per bone culture sensitivity who are not improving may have fungal involvement which requires antifungal treatment. Thus bone samples obtained from these patients should be sent for fungal culture.
Aim: To analyze if metabolic control of diabetes mellitus is associated with presence of inflammatory markers in diabetic foot osteomyelitis (DFO).

Method: A prospective study was performed in 23 patients with Diabetes between October 2015 to October 2016. Patients with diabetic foot ulcer complicated with osteomyelitis confirmed by histopathology and underwent conservative surgery were included. Blood samples were taken prior to surgery. Mean age of patients was 41 years ± 10.50. 19 patients were male (68%). 3 patients (14%) had DM type 1 and 20 patients (85%) DM type 2. Diabetes duration was 19 ± 12.53 years. Mean body mass index (BMI) was 27 ± 6.09 kg/m2 and mean of HbA1c was 7.5 ± 1.5%. Diabetic foot ulcers suffering time was 15.71 ± 23.42 weeks. ESR, CRP and leukocytosis were analyzed. Correlation of variables were analyzed using chi-2 test for qualitative variables and Spearman correlation for quantitative one. SPSS V.21.0 for Windows was used for statistical analysis.

Results/Discussion: Patients with longer duration of Diabetes had higher leukocytosis values (8.81[7.2-9.7] p=0.001). Higher ESR (26.5[21.35-37.75]) values were associated with patients who had a higher value of HbA1c (p= 0.042). We found statistically association between patients with elevated CRP (1.3[0.6-8.7]) and leukocytosis (p=0.027). No association was found between inflammatory markers and ulcer healing time.

Conclusion: Abnormal inflammatory markers values in patients with DFO were associated with poor metabolic control. Poor metabolic control could be related with worse infection presentations of DFO. However, healing time were not associated abnormal inflammatory markers. Probably surgery homogenizes short term outcomes in these kinds of patients.
Aim: The purpose of this study was to evaluate the characteristics and clinical course of patients with diabetic foot osteomyelitis.

Method: A retrospective observational study was performed. Patients reviewed were observed for the first time in a multidisciplinary outpatient diabetic foot clinic between January and December 2014. We included those with probable osteomyelitis (obtained from clinical and radiological criteria). The following data were obtained: gender, age, diabetes duration, presence of arterial disease, microbiological isolations and use of antibiotics. Adverse outcome was defined as death or amputation.

Results/Discussion: We included 56 patients; the majority of them were male (67.9%). Median age was 64 years (min. 32, max. 93) and mean duration of diabetes was 18.1 years (+- 10.0). Peripheral artery disease was present in 71.4% (n=40). In 67.9% (n=38) of the patients cure was achieved with medical treatment only; of these, more than one antibiotic course was necessary in 57.9% (n=22). Amputation was performed in 30.4% (n=17) of the patients [28.6% (n=16) were submitted to minor amputation and 1.8% (n=1) to major amputation]. One patient died during hospital admission from diabetic foot infection. No correlation was found between the adverse outcome and peripheral artery disease. Nine patients (16%) had infection with multi-resistant bacteria (methicillin-resistant Staphylococcus aureus or quinolone-resistant Pseudomonas aeruginosa); no extended-spectrum beta-lactamase-producing bacteria were isolated.

Conclusion: Although a considerable percentage of patients need amputation in the course of diabetic foot osteomyelitis, medical treatment, which sometimes requires more than one antibiotic course, was effective in treating 67.9% of patients. In our series, the presence of peripheral artery disease was not correlated with the outcome. More studies are needed to define which factors can be predictive of amputation.
Aim: To evaluate lower limb amputation rate and to establish predictors of amputation in moderate and severe diabetic foot infection (DFI).

Method: A prospective study of patients with moderate and severe DFI episodes seen in a tertiary referral center was performed between October 2012 and June 2014. Demographic and clinical data related to each episode were evaluated. Univariate descriptive analysis was performed and a logistic regression model was created to predict lower limb amputation.

Results/Discussion: A total of 151 episodes of moderate and severe DFI were recorded, corresponding to 118 patients. Amputation (minor and major) occurred in 52 episodes, representing a total amputation rate of 34.4% episodes. Major amputation occurred in 6.6% of all episodes. Patients were 63.9±12.3 years old; 72.8% were male; 86.8% had type 2 diabetes. Infection was severe in 18.5% of the episodes; osteomyelitis was present in 71.5%; there was a previous lower limb amputation in 37.1%; and peripheral arterial disease (PAD) was present in 56.3%. Presence of PAD [OR 5.69 (95% CI 2.47-13.12; p<0.001)] and previous lower limb amputation [OR 2.37 (95% CI 1.12-5.01; p=0.024] were identified as risk factors for amputation. There was no significant association between amputation and osteomyelitis or severity of infection (moderate vs. severe).

Conclusion: In this sample of episodes of moderate and severe DFI, amputation occurred in 34.4% of the episodes (93.4% minor amputation). In moderate and severe DFI, risk of amputation increases six-fold in the presence of PAD and two-fold if there was previous lower limb amputation.
Aim: Diabetic foot ulcers with osteomyelitis can require long term IV antibiotics. Infections caused by pseudomonas or multi-resistant coliforms are prescribed thrice daily piperacillin/tazobactam. There are limited IV/oral options for these patients due to antibiotic resistance, bone penetration of antibiotic and high c difficile risk. The thrice daily administration usually results in a hospital admission. Continuous infusion of piperacillin/tazobactam over 24 hours via an infusion pump enables patients to have it at home as it is once daily. The advantages are: more patients can be treated at home, capacity for home IV treatment is maximised and less risk of breaking aseptic technique and line infection/thrombosis/tissuing of cannula (continuous infusion). Furthermore as penicillins show time dependent bactericidal effects, pharmacokinetic studies show as good or better outcomes with 24 hour continuous infusions and improved antimicrobial stewardship (avoid unnecessary carbapenem use).

Method: We introduced piperacillin/tazobactam over 24hours as a pilot to enable early discharge or admission avoidance for diabetic foot patients. Patients were selected based on ulcer microbiology results and suitability for home IV therapy. Doses were 9g or 13.5g/24 hours based on renal function.

Results/Discussion: The pilot ran for 2 months and 9 patients were referred, however only 7 were treated. 265 days of therapy were administered via 24 hour infusion in total, in theory saving 265 bed days or 530 visits for IV doses in the community. All patients had a similar outcome as predicted from thrice daily administration. Patient satisfaction and experience were improved as the treatment regime was less obtrusive to daily life. The cost of each 24 hour infusion bag 13.5g was £55+VAT whereas the cost per day of three times a day piperacillin/tazobactam is £2.73 +VAT, an increase of £52.27 per day but this cost difference is mitigated by savings in bed days or home IV slots. There were no significant patient adverse effects.

Conclusion: The use of 24 hour infusion devices enables patients to have more convenient IV therapy at home which is highly cost effective in the context of savings in bed days and home IV slots.
Aim: To evaluate whether the introduction of a 12-lead ECG to assess for QTc prolongation as part of routine care for those with diabetes presenting with foot ulceration in England, and whether appropriate clinical action based on the ECG, is associated with reduced mortality. This is an interim report.

Method: New patients with diabetes and foot ulceration at 10 multidisciplinary foot services in England, undergo 12-lead ECG to assess for QTc prolongation. Males and females with QTc 431-450 and 451-470 milliseconds respectively undergo foot clinic review of medications and loosening of glycaemic control where indicated, in addition to standard foot care; those with QTc > 450 and > 470 milliseconds respectively undergo direct referral to cardiologists.

The service improvement, initiated in July 2014, interfaces with the National Diabetes Footcare Audit in England. Audit participation requires informed consent for linkage of data with primary care, hospital and Office for National Statistics datasets. Audit participants cared for in non-ECG centres, so without routine ECG, act as the control population – control numbers are approximately 5 times greater. For 80% power at p<0.05, 4115 audit participants with ECGs at ECG centres are required to demonstrate reduction in 2 year mortality from 31.5% to 26.9%.

Results/Discussion: By December 2016, 1400 subjects had had ECGs at ECG centres. Prevalence of QTc prolongation was 23%, and 25% had had additional management as a result of the ECG. To increase recruitment rate, from April 2017, further centres will join. Recruitment will continue until December 2018, and mortality will be assessed in December 2020 in audit participants who have had an ECG at an ECG centre vs. those cared for at a non-ECG centre. Clinicians report that it is challenging within the foot clinic environment to both collect data for the Audit and interpret and act on the ECG. Nevertheless, all ECG centres that initiated have continued.
Conclusion: The evaluation will complete in 2021, and is adequately powered to demonstrate whether incorporation of a 12-lead ECG to assess for QTc prolongation as part of routine care within the diabetic foot clinic beneficially affects mortality in this population.
Aim: Amputation is one of the severest complications in the diabetic foot, having a major impact on quality of life. In a specific group of patients, Syme amputation can be a limb saving alternative. In this study, we want to determine the outcome of the stump and the fate of the contralateral limb (CL) and identify parameters that can be predictive for the outcome of this amputation.

Method: 17 diabetic patients (age 62.47±6.50 years) that underwent a Syme amputation in the University Hospitals Leuven between 1998 and 2008 were retrospectively investigated. Clinical data, laboratory and vascular testing results and operation reports were analyzed. A successful Syme amputation was defined by a healed stump and functional usage of a prosthesis for at least 3 months.

Results/Discussion: In 8/17 patients, a successful result was achieved with a stump healing period of 53 (IQR:35.50-139.50) days and a period of 80 (IQR:43.00-198.00) days before measurement of prosthesis. From the other 9 patients, 8 required a secondary amputation. The other patient suffered from recurrent fistulas. For all failures, infection was a contributing factor. In the group receiving a 2-stage procedure, 5/6 required a secondary amputation within a year after Syme. Analysis revealed that the median TcpO2-value and the presence of peripheral pulsations differ in the group with a successful procedure compared to the group without success (TcpO2:22 vs.9.5mmHg, p=0.045 and pulsations: p=0.048).

Eight patients developed wounds on the CL after amputation (3 successful Syme’s). In 5 patients, this resulted in an amputation: 2 minor and 3 major amputations.

The low success rate can be partially attributed to the elderly population and impaired peripheral blood flow. The high failure rate for the 2-stage procedure can be possibly attributed to the short period between stages combined with the presence of peripheral arterial disease.

Conclusion: In half of our population, the Syme amputation was a limb saving alternative with preservation of an acceptable level of mobility. Infection and impaired peripheral blood flow appeared to be predictive for the outcome. As to be expected the CL is at risk, but only 8/17 patients developed wounds with 2 resulting in a major amputation.
Aim: Diabetic foot ulcer is a major cause of morbidity and mortality in the world, with much of the economic and social costs related to hospitalization and to lower extremity amputations. While racial/ethnic differences in diabetes are well documented, less attention has been given to differences in diabetic foot ulcer by gender. Aim of the study to evaluate differences between genders in diabetic foot ulcer.

Method: We have retrospectively evaluated 172 subjects with diabetic foot ulcer between January 2016 and December 2016. 99% of patients have type 2 diabetes, mean age was 73.4 ± 10.8 years (mean ± SD), 80 (46.5%) patients were over 75 years and a long history of diabetes 18.6 ± 10.3 years was founded. We divided population in two group based on gender.

Results/Discussion: 117 (68%) patients were men. The average age was longer in women (78.1± 9.55 years vs 71,1± 10.7 years, p<0.001) and 34 (61.8%) women were over 75 years. Women and men had similar diabetes duration (17.7±8.0 vs. 19.0±11.2 years) while women had worse metabolic control (HbA1c 7.94%± 2.0 vs 7.67%± 1.4) and higher prevalence of chronic kidney disease (47.2% vs 34.1%). Men had higher prevalence of retinopathy (41% vs 29%) and ischemic heart disease (31.6% vs 20%). No gender-difference were found in prevalence of hypertension, dyslipidemia, atrial fibrillation and BMI. Both groups presented a similar rate of peripheral neuropathy, while peripheral arterial disease was prevalent in women and need to revascularisation too (23% vs 18%, p <0.001). Amputations were more common in men (20.5% vs 10.9%, p<0.001).

Conclusion: Data from this study show that women with diabetic foot ulcer are more older, have a higher prevalence of peripheral arterial disease and need to revascularisation too, while confirm that risk of amputation is higher in men.
Aim: Diabetic foot syndrome is a debilitating condition that increases risk of leg amputation. In case of non-optional ischemia, we tend to find another method how to help to improve tissue viability and heal the ulceration. Rheopheresis means double plasma filtration, the high-molecular-weight particles as fibrinogen, LDL cholesterol, alpha 2 macroglobulin and IgM are removed. Improving the blood viscosity is followed by improvement of the endothelial function and better microcirculation. Unfortunately we have only low evidence about efficacy of this treatment in diabetic neuroischemic ulcerations.

Method: Three Type 2 diabetic patients (2 men 72 and 59 years old and 1 woman 48 years old), with persistent low peripheral blood pressures and tcpO2 (even after a couple of revascularization procedures) had 7 non-healing neuroischemic ulcerations. All those patients underwent rheopheresis treatment (3 or 4 procedures according to the fibrinogen level decrease). We measured high-molecular-weight particles concentrations in plasma, ankle brachial and toe brachial indexes and tcpO2, size of the ulceration and we also checked the level of calf muscles metabolism via 31MRI examination*. The measurement was provided before the treatment, 1 week and 1, 2 and 3 months after rheopheresis treatment.

Results/Discussion: After series of rheopheresis treatment we observed significant decrease in plasmatic concentrations of LDL and HDL cholesterol particles, fibrinogen, IgM, alfa-2-macroglobulin, lipoprotein(a) and fibrinogen. Concentrations of these particles reached their pre-treatment level after 2 months. We observed significant increase of toe brachial pressures and tcpO2 levels in 1 week, 1 month and 2 months after treatment. The metabolism of calf muscles was slightly better immediately after the rheopheresis treatment. The most important observation was the reduction in size of long-lasting non-healing ulcerations. The sum of ulcer area in all patients decreased about 80% (from 0.63 to 0.12 cm², from 1.15 to 0.33 cm² and from 2.48 to 0.52 cm²).

Conclusion: The rheopheresis treatment could be very helpful in supporting microcirculation in patients with non-optional ischemia and helps to heal previously non-healing diabetic ulcerations.

We continue, new patients entered the study recently, so we expect increase in data at the time of DFSG meeting.

*FID technic
Fibrinogen (fbg) and alfa2 macroglobulin (maa) level
JJ, FL and JK are patients initials

Toe – brachial index
Aim: The investigation of patients’ factors which are associated with elevated protease levels in diabetic foot ulcers.

Method: Descriptive correlation approach was used in this study and the convenience sample consisted of 15 patients with diabetic foot ulcers. Data collection was conducted in two phases, upon the entry to the study and after four weeks. A database was created for the needs of the study, in which all data relating to the general condition of patients, the diabetic foot ulcer and the protease activity measurement with a specific clinical tool*, were recorded. For the statistical analyses the SPSS 22.0 program was used.

Results/Discussion: In the study population, 8 patients (53.3%) were male, and the mean age of the sample was 64.13 years (SD ± 12.79). In the second study phase, the ulcer area seemed to be decreased (mean = 1.1, SD ± 1.83) in comparison to the first phase. In the first study phase, the elevated Proteases activity (EPA) test showed that 6 (40%) patients had elevated protease levels, while in the second phase this number fell to 4 (26.7%). The patients’ factors positively associated with elevated protease levels were female gender (p = 0.015), higher value in co morbidity index (p = 0.018), peripheral neuropathy (p = 0.018) and ischemia (p = 0.022). In the literature, the percentage of chronic diabetic ulcers with EPA was found 33-60% (Chadwick & Haycocks, 2013 and Anichini et al, 2013 respectively).

Conclusion: In our study, the protease activity measurement in patients with chronic diabetic foot ulcers, was correlated with high co morbidity index, neuropathy and ischemia. This findings may be useful, in order to choose the appropriate patients who will be benefit of the protease level test. Nevertheless, further studies involving larger patient samples are needed, in order to confirm these findings.

*WOUNDCHEK™ Protease Status test
Aim: Study the impact of topical phenytoin loaded nanostructured lipid carrier (PHT-NLC) in improving wound healing in patients with neuropathic diabetic foot ulceration (NDFU).

Method: Twelve patients with NDFU under the metatarsal-heads were enrolled in this study. Patients were comparable regarding ulcer size, grade and control of diabetes with no major deformity. All patients were managed by weekly sharp debridement if indicated and offloading with cast shoes done by the same hands. They were divided into three groups: PHT-NLC-hydrogel (0.5%w/v), phenytoin (PHT) hydrogel (0.5%w/v) and blank-hydrogel groups. Wound area was assessed after 1, 4 and 8 weeks. Also, we investigated the in-vitro release of PHT and PHT-NLC-hydrogels by modified Franz diffusion cell at pH 7.4 up to 48h.

Results/Discussion: Ulcers treated with PHT-NLC-hydrogel showed complete healing in two cases and smaller wound area compared to the control groups (p< 0.05). Baseline wound area of PHT-NLC, PHT and blank-hydrogels were 3.42±1.77, 3.62±1.98 and 3.87±2.39cm², respectively. The average wound area changed to 3.19±1.98, 3.51±1.75 and 3.60±1.63cm² respectively after the first week; 0.86±0.40, 2.62±1.40 and 4.07±1.65cm² after the fourth week; 0.10±0.15, 1.69±0.78 and 4.06±1.93cm² after the eighth week respectively. Overall reduction in ulcer size was 97.48±2.61% for PHT-NLC-hydrogel, in comparison to 52.29±9.18% and -9.58±14.85 % for PHT-hydrogel and blank-hydrogel groups respectively (p< 0.001) (fig 1,2,3). This may be attributed to small particle sizes of the NLC-hydrogel with subsequent large surface area, its lipoid nature (acts as a reservoir), in addition to solubility and penetration enhancement that increase the skin delivery. Also, the in-vitro release study clarified that, drug release from the NLC-hydrogel displayed a biphasic release pattern with initial burst followed by sustained release. On the contrary, in PHT-hydrogel drug release was very rapid and completed within 48h.

Conclusion: PHT-NLC-dressing is more effective than PHT-hydrogel at the same concentration in healing of NDFU. This effect may be assigned to its small particle sizes with consequent increase in its solubility, in addition to their biphasic release pattern that is recommended for topical products. These promising results encourage large scale trials for use of PHT-NLC in treatment of diabetic ulcers and other chronic wounds.
Fig 1: The healing progression during 8 weeks of 0.5% w/w blank hydrogel usage

Fig 2: The healing progression during 8 weeks of 0.5% w/w phenytoin-loaded nanostructured lipid carrier hydrogel usage

Fig 3: The healing progression during 8 weeks of 0.5% w/w phenytoin-loaded nanostructured lipid carrier hydrogel usage
The Use of Sodic-Salt DNA Fragments in the Progression of Wound Healing in Diabetic Foot. A Case-Control Study

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Aim: Diabetic foot syndrome is a multifactorial condition often requiring surgical intervention to heal. In this way we are able to keep the foot as longer as possible. In order to reconstruct tissues we can use various devices, such as NPWT, engineered tissues, dermal substitutes (DS). Recently a new sodic-salt DNA fragments (SSDF) preparation became available to use with the aim to exert tissues reconstructive action through cytokines production and nucleotide synthesis. In this study we aimed to evaluate the usefulness of SSDF in accelerating the healing rate of diabetic foot residual lesions.

Methods: Between January 2016 and December 2016, we enrolled 60 consecutive patients which underwent to open transmetatarsal amputation (40 pts TMA) or open rays amputation (20 pts RA). All patients underwent to the application DS. When DS was completely integrated to patient’s tissues, every patient of each group (TMA and RA) was alternatively allocated or to the treatment group (Group S: 20 TMA, 10 RA) or to the control one (Group C: 20 TMA, 10 RA). S treatment implied disinfection with antiseptic solution and the application of SSDF cream three times a week and sterile gauzes dressing for 4 weeks. C treatment was the same, apart from SSDF cream. All patients wore medical shoes. We evaluated the effects of SSDF application on lesions’ healing rate and healing time and 1 (T1) and 4 (T4) weeks reduction rate of the lesions’ area (cm²).

Results: 3/30 (10%) of the S and 7/30 (23,3%) of the C did not heal. The healing time (wks) was significantly lower in S than in C (5,74±1,16 vs 8,22±2,92; Mann-Whitney, p=0,001). T0 areas were not different between the 2 groups (S23,59±5,03 vs C22,50±4,94). T1 areas were not different between the 2 groups vs T0 (S 15,82±4,06 vs C 15,39±5,40; t-paired test NS). T4 areas were statistically significantly different between the 2 groups S4,06±2,62 vs C5,67±3,50; t-paired test p<0,005).

Conclusions: This study highlighted a significantly lower healing time in patients treated with SSDF and a lower residual lesions’ area after 4 weeks-treatment respect to the controls. SSDF could be considered a new adjuvant-therapy in the treatment of diabetic foot lesions.
Aim: Unfavourable healing of diabetic foot ulcers could be improved by local application of cell therapy, but the hope has not been fulfilled yet. The aim of our study was to compare the process of wound healing in diabetic porcine model treated with local application of human mesenchymal stromal cells derived from bone marrow or adipose tissue.

Method: Diabetes in six pigs was induced by a single intravenous injection of streptozotocin 150 mg/kg bw and confirmed by a blood glucose level higher than 15 mmol/l. Each animal was wounded by 21 full-thickness skin excisions in the back area one month after the induction of diabetes. Immediately after wounding, the suspension of human cells as injected in triplets into the base of the wounds. There were seven therapeutic eventualities: 4 ml of bone marrow mononuclear cells; 4 million of bone marrow mesenchymal stromal cells or 4 million of adipose tissue mesenchymal stromal cells; each time from diabetic and nondiabetic donors. The seventh triplet of wounds has been assessed as controls. Wounds were covered by silicone dressing and all animals were treated by insulin and immunosuppression. Photographs and measurements of the wound has been taken for the assessment of the effect of cell therapy on wound healing after 7, 14, 21 and 28 days of the appropriate therapy.

Results/Discussion: The sizes of the wounds before treatment were comparable in all groups. After 7, 14, 21 and 28 days, there was a significant reduction of wound size in all groups, including controls (p<0.01). After 14 days, a significant acceleration of healing in all cells groups in comparison with the controls was seen (all p<0.05); there was no significant difference between individual cell groups. Only 50 % of control wounds were healed after 28 days, in contrast to cell treated wounds, where 75- 87.5 % of wounds were healed.

Conclusion: In our experiment, the local application of human multipotent cells derived from bone marrow and adipose tissue accelerated wound healing in diabetic porcine model. Topical cell therapy could be a promising treatment for non-healing wounds in patients with diabetic foot ulcers.
Aim: Diabetic foot ulcers (DFU) remain a challenging task in the clinic. These chronic wounds often have high bacterial load but conversely leukocyte recruitment is impaired. Recent data demonstrates that induction of acute wound healing through interleukin-1 beta (IL-1β) signalling restores chemotaxis and engage wounds onto the trajectory of healing.

To investigate the mode-of-action of an autologous blood-derived platelet- and leukocyte rich fibrin-patch*, used and tested for DFU, the present study investigates its immunological response to stimuli relevant for its clinical use.

Method: The company** has devised a medical device that provide the means of preparing an autologous blood-derived platelet- and leukocyte rich fibrin-patch*. The leukocyte rich fibrin-patch* is created without additives by drawing peripheral blood into a vacuum containing device at the patient bedside.

The leukocyte rich fibrin-patch* was formed from 3 donors by the 20 min centrifugation, coagulation and compaction process***, ****. The resulting three-layered patch containing fibrin, platelets and living leukocytes, was cultivated in-vitro over the course of 48 hours in RPMI-1640 medium or treated with; LPS (10 ng/ml), IL-4 (40 ng/ml) and IL-13 (20 ng/ml) or Chronic Wound Fluid (CWF 2%). Culture supernatants were analysed for 1000 soluble analytes using kiloplex array*****. Dehydrated human amnion/chorion membrane (dHACM)****** was included as a control wound care product.

Results: 818 analytes were detected in the leukocyte rich fibrin-patch* while 335 were detected in dHACM. Further analysis found that the leukocyte rich fibrin-patch* produced 659 analytes (>2-fold threshold) over dHACM. Evaluating these cytokines using the Gene Ontology (GO) consortium we found acute inflammatory response, regulation of cell proliferation and positive regulation of cell communication to be overrepresented. Whereas dHACM released 58 analytes >2-fold over the leukocyte rich fibrin-patch* associated with multicellular organismal process, extracellular structure organization and regulation of locomotion.

Furthermore, we find that CWF induce production of 129 analytes with STAT3 signalling and T cell co-stimulation induced when compared to the untreated leukocyte rich fibrin-patch* control.

Conclusion: Results suggest that the leukocyte rich fibrin-patch*, beside cells and growth factors, provide immunological signals involved in acute wound healing and that the leukocyte rich fibrin-patch* adapts to its environment. Interestingly STAT3 signalling may provide the transition from pro-inflammatory responses to the anti-inflammatory wound healing status.
THE RELATION BETWEEN (DAY-TO-DAY CHANGES IN) LEFT-TO-RIGHT DIFFERENCES IN CUMULATIVE PLANTAR TISSUE STRESS AND PLANTAR FOOT TEMPERATURE AT HIGH-RISK LOCATIONS IN DIABETES PATIENTS

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Background: Home-monitoring of skin temperature can be used to detect early signs of inflammation, that acts as a precursor to ulceration, and supposedly occurs as a result of repetitive stress on the foot while ambulant. However, the evidence to support this biomechanical mechanism of temperature increase and inflammation is meagre.

Aim: To investigate the association between (day-to-day changes in) left-to-right differences in cumulative plantar tissue stress and plantar foot temperature at high-risk locations in diabetes patients.

Method: Thirteen patients with recent ulcer history participating in a trial on efficacy of home-monitoring of plantar foot temperature had their barefoot and in-shoe plantar pressures measured. Daily walking activity and footwear adherence were measured over 7 consecutive days, while on the same days, the patient measured skin temperature at the hallux, first, third, and fifth metatarsal head of both feet in the early morning with an infrared thermometer. The difference in cumulative plantar tissue stress (CPTS = (in-shoe PTI x adherence)+(barefoot PTI x (1-adherence)) x stride count) between left and right foot was calculated per region. Per patient and region, correlation coefficients for left-to-right difference in CPTS (dCPTS) and difference in skin temperature (dT) were calculated.

Results: Correlation coefficients between dCPTS and dT varied from −0.850 to 0.689 across regions and patients, with an overall correlation of -0.005. From the total 52 calculated coefficients, only 3 were >0.6, and none were significant. The correlation between mean dCPTS and mean dT for the hallux was 0.617 (p=0.033), and varied from -0.450 to 0.233 for the other regions. In only 2 patients a dT of 2.2°C was measured on 2 consecutive days.

Conclusion: Based on the results of this explorative analysis, that included a comprehensive biomechanical method to determine the total load on the foot, the data seem to suggest that left-to-right difference in cumulative plantar tissue stress, and changes thereof over time, are mimicked by left-to-right differences in plantar foot temperature and changes thereof over time. Several methodological limitations prevented us from drawing strong conclusions on this matter, and more detailed studies with longer follow-up and multiple temperature assessments per day are therefore needed.
Aim: The aim of this study was to prevent the below knee amputation by using ‘Tarsal tunnel sparing incision’ in the complicated diabetic foot and ankle infections and also to reduce the risk of posterior tibial vessels/nerve injury and the ankle joint exposure caused by the conventional incisions.

Method: A total of 25 Type 2 diabetes patients with foot and ankle infection visiting the tertiary care unit (Podiatry Department) were recruited in the study. Patients with diabetic foot and ankle infection of moderate to severe category according to International Working Group on Diabetic Foot (IWGDF) were included in the study. Likewise patients with mild to moderate category and limited to the foot were excluded from the study.

Results/Discussion: ‘Tarsal tunnel sparing incision’ technique stops the plantar incision distal to heel and continues behind the medial malleolus above the ankle, sparing the tarsal tunnel. Removal of the pus and retrieval of the infected tendons were effectively achieved using this technique. All the patients underwent this procedure were recovered from the infection within a week and the mean healing duration was 6.5±0.5 weeks. This incision gives an adequate exposure for the removal of the pus and infected FHL /FDL tendons which act as ‘pus highways’ spreading infection from the foot to the ankle and the leg. In some complicated diabetic foot and ankle infections, ‘Loeffler Ballard incision’ and its modifications incision pose the risk of posterior tibial vessels/nerve injury and also the possible exposure of the ankle joint and instability. There is a paucity of literature stating the complications due to conventional incision technique, which lacks the comparison with the current technique. However Tarsal tunnel sparing incision avoids the meticulous dissection at the ankle region where the tibial vessels and nerve were tightly packed at the tarsal tunnel.

Conclusion: The Tarsal tunnel sparing incision technique prevents the progression of infection and major amputation among Type 2 diabetes subjects with complicated foot and ankle infections.
Aim: To estimate clinical effects of NPWT and collagen dressings in comparison to standard management of diabetic foot ulcers (DFUs).

Method: Clinical examination, tcpO2 before and after local treatment.

Results/Discussion: 63 patients were enrolled (42 men; 21 women) with DFUs after surgical debridement and divided into 3 groups. Group 1 (n=21) was treated with NPWT (-90-120 mmHg), group 2 (n=21) used collagen dressings and group 3 (n=21) was treated with atraumatic dressings for 9±2 days. Group 1 and group 2 were not compared due to different mechanisms of treatment.

The groups matched by DM type, age (group 1 60[52;64], group 2 55[50;66] group 3 60[57;72] years), HbA1c in group 1 -8.8[7.4;10.6]%, in group 2 -8.3[7.8;9.5]%, in group 3 -8.8[7.6;9.7]%, severity of microvascular complications, form of diabetic foot (neuropathic-33, neuroischemic-30(after revascularization)), wound size (group 1 - 25.0[16.2;44.5] cm², group 2 - 18.6[15.3;22.8] cm², group 3 - 23.5[12.3;55.3] cm²), wound depth (group 1 – 3.3[1.5;6.5] cm, group 2 – 2.8[2.2;3.2] cm, group 3 - 3.2[2.4;5.2] cm), tcpO2 (group 1 - 46[38;52] mmHg, group 2 - 47[41;51] mmHg, group 3 - 43[38;47] mmHg), p>0.05.

In follow-up period wound size decreased more in group 2 – in 26.4 (p<0.05); in 19.8% in group 1 (p>0.05), in 17.0% in group 3 (p>0.05).

The depth decreased more significantly in group 1 - in 42.8% (p<0.05), in group 2 – in 30.4% (p>0.05), in group 3 – in 16.6% (p>0.05).

TcpO2 increased more significantly in group 1 52[48;58] mmHg (p<0.05), in group 2 48[45;53] mmHg (p<0.05), in group 3 39[32;47] mmHg (p<0.05) after treatment.

Conclusion: According to results NPWT more effectively decreases wound depth and increases tcpO2 and collagen dressings more effectively decrease wound size in comparison to standard care in DFUs treatment.
Aim: In minor amputation surgery, stumps are usually closed with sutures such as vertical mattress. In the ischemic foot, however, wound dehiscence and necrosis of wound edges are sometimes observed. This can be caused by poor blood flow due to tension of suturing. Therefore, a bony stump has to be sufficiently shortened for tension free suturing. It results in a decreased weight-bearing area and leads to gait instability. To avoid this undesirable result, we performed non-suture technique utilizing negative pressure wound therapy (NPWT) for the ischemic foot.

Method: The incision planning for debridement was designed based on the assumption that the defect would be closed by fillet flaps. The bony stump was resected to allow adequate soft tissue closure. The wounds were left open and alginate dressings were applied for hemostasis. On post-operative day one, the wounds were treated with NPWT. Fillet flaps were gradually advanced by NPWT, and complete wound closure was achieved.

Results/Discussion: 20 patients underwent this non-suture technique for wound closure. All wounds healed successfully without utilizing skin grafts and there were no complications.

Conclusion: Minor amputation wound closure is generally achieved using sutures. In order to avoid wound dehiscence or necrosis of wound edges in the ischemic foot, bony stumps must be sufficiently shortened for tension free suturing. To completely reapproximate wounds with suture technique the residual foot length may be compromised. This may lead to gait instability. On the other hand, skin grafting is usually performed after NPWT, but skin grafts tend to be weaker in resisting friction and load in comparison to skin flaps. Non-suture technique utilizing NPWT is considered a practical and appropriate measure. In comparison to direct closure, the non-suture technique maximizes the weight-bearing area and maintains the foot length more. This technique also creates a more resistant amputation site than the skin graft technique making it more advantageous in gait stability. This technique was found to be convenient and safe, but a prospective comparative study is needed to confirm the usefulness in ischemic foot.
Aim: Since July 2013 our group has been using an antibiotic bone substitute, composed of calcium sulphate, hydroxyapatite and gentamicin sulphate (CSH + HA + GS), in the treatment of osteomyelitis (OM) in diabetic foot. The aim of this work was to evaluate the mid-term efficacy of this treatment regime on outcomes. A favorable outcome in diabetic foot includes no recurrence of OM, healed soft tissues and the ability to weight-bear.

Method: In this study we reviewed patients treated from July 2013 to December 2016, in which we used CSH + HA + GS to treat OM of the forefoot, midfoot and hindfoot, and evaluated how many patients are able to walk and fully weight-bear at present. We identified 11 pts treated during this time period; 1 with bilateral 1st metatarsal-head OM due to plantar ulcers, 5 with midfoot OM secondary to Charcot deformities and ulcers, 5 with hindfoot OM due to pressure ulcers or Charcot deformity. We continuously monitored the patients for recurrence of OM, ulcers and soft tissue inflammation in our outpatient department.

Results/Discussion: Of the 11 patients, two died during follow up (both patients had calcaneal ulcers; one died in the 1st month and one in the 2nd month after treatment, both due to cardiovascular disease). For the remaining nine patients, we had an average of 25 (17–33) months follow-up. One patient did not heal, presenting with a persistent mid-foot lesion in a Charcot foot. Another patient with bilateral forefoot ulcers had a plantar ulcer recurrence under the left 1st metatarsal foot, 19 months after bone substitute application and primary healing. This patient is still weight-bearing on the right foot, as are the remaining 7 patients. In 8 patients (1 with bilateral forefoot, 4 with mid-foot and 3 with hindfoot OM) no recurrence of OM or ulcers was observed.

Conclusion: This study suggests that a CSH + HA + GS bone substitute can be used to treat diabetic foot OM. Our mid-term results show good clinical outcomes in terms of ulcer healing, no recurrence of OM and weight-bearing.
Aim: To improve the quality of life of patients with infectious complications of diabetic foot syndrome.


1) When treating neuropathic ulcers caused by deformation of the forefoot (10 patients), we used extrafocal corrective mini-osteotomy (ECM) of the metatarsal bones ± finger flexor tenotomy against the backdrop of the one-off antimicrobial therapy (AMT).

2) Where the metatarsal bones and metatarsophalangeal joints break down (37 patients) we combined the one-off AMT with resection of the affected bones and subsequently filled the defect with antibiotic impregnated collagen sponge (AICS).

In case of Charcot foot after resection of the affected bones and excision of the infected soft tissues against the backdrop of AICS therapy:

3) forefoot – the limb was immobilized with appropriate dressings (14 patients); 7 days AMT;

4) midfoot – foot stabilized with compression screws (37 patients); 7 days AMT;

5) hindfoot – extrafocal corrective osteosynthesis using Ilizarov technique (6 patients); 21 days AMT.

Results/Discussion: The observation period ranged 15-58 months. In groups 1-3 there were no complications and recurrences. Five patients in group 4 had septic instability of the screws in terms 1-5 months - the screws were removed without loss of the foot correction. Only one patient in connection with the complications produced by amputation at the Shin level. The remaining 103 patients had no amputations, even at the level of the toe.

Conclusion: The presence of infectious complications of the diabetic foot syndrome is not a contraindication for carrying out reconstructive plastic surgery, including a fusion.
Aim: To evaluate costs and resource utilization of a domiciliary service of NPWT placement for diabetic foot ulcers (DFU) managed by visiting nurses (VN) of National Health Service.

Method: We retrospectively analyzed the databases of a local Health Authority Service and of the University Hospital in which all the DFU cases of the area are admitted for surgical procedures, for the year 2015. All the patients to which NPWT was prescribed during admission and to which it was then applied and managed by VNs at their home were traced and healing rates (HR) and times (HT), number of days of NPWT, costs and days of in-hospital stay were sorted out and compared to those of 2012, when the service was not active.

Results: 52 DFUs patients among those admitted in 2015 were managed for NPWT by VNs. Their HR (87.5%) and HT (143.6 ± 38.2 days) didn’t significantly differ from controls, while the length of NPWT was considerably shorter (14.1±5.4 vs 20.7±11.3 days, p<0.01). The costs, calculated as number of days of therapy and days of in-hospital stay were significantly decreased in 2015, when normalized for the number of patients and days of NPWT (31.2 € vs 450 € per day of therapy, respectively, p<0.001).

Conclusion: The implementation of a domiciliary service for the delivering of NPWT to DFU patients after surgical intervention proved not only to be as safe and effective than the in-hospital management, but also was associated to a significant reduction of costs and resource utilization.
Aim: To evaluate the role of sequestrectomy as a better solution compared to long term conservative treatment in diabetic patients.

Method: We performed 52 consecutive sequestectomies in 51 diabetic patients with bone involvement demonstrate by a positive probe to bone and a positive rx. For each patient the part of bone resected resulted with abnormal consistence and was collected in a sample. In our study there were 80% males and 20% females. Mean age was 70±10 years old. Mean HbA1c values 8.2±2.4%.

Results/Discussion: In our study 37 patients (72%) resulted with peripheral vascular disease, while 15 patients (28%) had no arterial problems. In the histological examination 48/52 patients (92%) resulted positive for osteomyelitis (presented acute inflammation, micro-abscesses, necrosis of trabecolae). In 4/52 patients (8%) resulted absence of osteomyelitis (presence of fibro productive process without infection). There were isolated a total of 54 strains. Among them 10 alert pathogens were identified (1 MRSA, 2 MRSCN, 1 Escherichia coli ESBL, 1 Klebsiella pneumoniae ESBL, 1 Pseudomonas aeruginosa ESBL, 2 VRE, 1 Acinetobacter Iwofii MDR and 1 Acinetobacter calcoaceticus-baumanii complex MDR). Twenty-two patients presented complete healing of the wound with a mean healing time of 85 ± 48 days. Antibiotic therapy was given orally for a mean duration of 22±9 days. No relapse of wounds or osteomyelitis was observed at the site of previous lesions in the follow up of 6 months.

Conclusion: Limited removal of infected bone is associated with a high percentage of success in healing osteomielitis with a very low relapse rate.
Aim: To find useful modifications of “Δ-frame” external fixator (EF) used for stabilization and surgical offloading after reconstructive surgery for diabetic foot (DF) and Charcot neuroosteoarthropathy (CN) suitable in case of partial foot ischemia or major patient discomfort.

Method: A tube-to-bar EF* was used in three variants: standard Δ-frame (Bonell pins with a central thread were passed through the metatarsal heads, then into the calcaneus and tibia and stabilized by double framed rods), hybrid frame (the same placement in tibia and calcaneus, but one or two semicircles with crossed tarso-metatarsal K-wire fixation), used in case of partial ischemia and unilateral frame (Schantz half-pins used instead of full-pins, with lateral rods) in cases of discomfort from metallic-part traumatization. Sixteen diabetic patients (11 men, 5 women), mean age 58 (40-76) years were included into the study and observed prospectively within years 2014-2016 (follow-up 2-36 months). Twelve patients were diagnosed by CN, other types of DF in 4 cases. Δ-frame was used in 6, hybrid EF in 7 and unilateral EF in 3 cases. Repeated hospitalisations, major complications – pin-tract infection (PTI), osteomyelitis recurrence (OM), non-union rate, hardware failures and EF adjustment episodes were tracked in all EF groups.

Results/Discussion: No major amputation was performed, we observed only one re-hospitalisation for severe osteomyelitis without need to disassemble EF. Overall PTI rate was 44% (80% around crural pins), in one case (hybrid group) a premature EF removal was needed. Two non-union cases underwent further fixation (1 from Δ-frame and 1 from hybrid group). No serious hardware failure occurred, 8 patients needed outpatient EF adjustments.

Conclusion: Despite the size of the group our results showed that there are no differences in complications between EF types, so all of them might be safely used. Hybrid EF lowers the risk of blood vessels traumatisation due to thinner diameter of the pins. The main advantage of unilateral EF is decreased traumatisation of the surrounding skin by sharp edges, but this technique does not tolerate higher loads because of high risk of pin breaking, therefore it should not be applied in patients with higher BMI.

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[P101] ARTHROPLASTY WITH EXTERNAL FIXATION AS A BETTER OPTION THAT ARTHROPLASTY WITHOUT FIXATION TO PREVENT LONG-TERM COMPLICATIONS IN PATIENTS AFFECTED BY OSTEOMYELITIS

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Aim: To analyse long-term complications in patients with Diabetic Foot Osteomyelitis (DFO) who underwent first metatarsal joint arthroplasty with and without external fixation.

Method: This is a retrospective observational study included 14 patients suffering DFO located beneath the first metatarsal head who met surgical indication for the treatment of bone infection. Patients who are not healed after surgical procedure were excluded for the follow-up. The patients were selected consecutively to the analysis and divided in two groups according to the surgical technique. Group A: patients underwent arthroplasty with external fixation (K-wire), and Group B: patients underwent arthroplasty without any fixation.

We follow up patients after wounds complete healing and we recorded any new ulcer in the same location of primary lesion (recurrence) or an ulcer in any other location on the feet (reulceration). Statistical analysis was conducted using SPSS for Macintosh, version 20.0*. Survival analysis was done by Kaplan-Meier’s test between both surgical techniques. P value < 0.05 was accepted as statistically significance with IC of 95%.

Results/Discussion: Ten patients (41.7%) were included in group A, and 14 patients (58.3%) in group B. Mean time follow-up was 23.6 months (Interquartile Range:11.4-41.7). Patients group A developed 1 (10%) recurrence and 6 (60%) reulceration and 5 (33.7%) recurrence in group B. Patients in Group B had higher risk of complication in the long-term outcomes (p 0.012), IC [0.067-0.712] (figure 1) than patients in Group A. Furthermore, Group B patients needed undergoing higher number of revision surgeries as a consequence of the complications of surgical procedure (p 0.031) IC [0.112-0.991].
**Conclusion:** First metatarsal joint arthroplasty with external fixation showed lower number of complications in a long-term follow up than arthroplasty without fixation in patients with DFO beneath first metatarsal head.

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Aim: Prospective study comparing the complication rates for acutely ankle fractures in diabetics with non-diabetic patients treated by all surgeons in our unit and assessing factors for success.

Method: Patient data was cross-referenced with theatre and departmental databases. Prevalence of diabetic foot ankle fractures was 12.5%. Fractures classified into unimalleolar, bi malleolar and trimalleolar and fixation assessed into standard or long segment/multi-column fixation. The Hb1Ac assessed diabetic control.

Patients underwent surgical management were subjected to a retrospective review and assessment of their follow up for minimum 6 months. Radiographs were assessed of the ankle before, during, and at completion of treatment were reviewed independently.

Relative Risk was calculated between normal, diabetic sensate and non-sensate populations and whom underwent standard or long segment/multi-column fixation.

Results/Discussion: Between Jan 2014 to Dec 2016 147 patients identified; 33 patients had operative treatment. 6-tri-malleolar-fracture, 20-bi-malleolar fractures and 7-unimalleolar fractures with the average length of stay as 13 days (13-86), average age of 61 (13-86). Average HBA1c was 7.64; rose to 8.07 at 6 months post index injury. If neuropathy found at presentation HB1ac was 8.48.

Raised HBA1c was associated with 61.5% of all complications, 77.8% non-unions, 100% wound complications and all those whom developed charcot neuroarthropathy. Hb1Ac was highest in patients with wound breakdown (9.81); non-union (8.34) and development of CN.

Complication rate in non-diabetic patients was 12.5% compared to 39.4% in diabetics. Relative Risk of a complication was 3.15 (P<0.03), risk increased with neuropathy (RR 5.8; p<0.003), and HBA1c>7 4.6 (p<0.0004). Combination of neuropathy and raised HBA1c increased relative risk to 6.22 (P<0.0003)

Individual analysis of 13 patients who underwent Rigid Multicolumn stabilisation with immobilization sand cautious bracing up to 6-months reduced the relative risk of complications to 0.65 or by 160%.

Conclusion: We believe that one of the most significant factors in predicting a complication after operative fixation of ankle fractures is the HBA1C, and/or the presence of neuropathy. Thus tight glucose control as part of the multi-disciplinary management could improve outcomes, as does the shift to long segment/multi-column fixation.