

KENYA ORTHOPAEDIC PROJECT: Nanyuki Hospital February 2009

In February 2009, a team travelled from the UK to Kenya at the request of Dr Samuel Ndanye, the sole surgeon providing both general and orthopaedic surgery at the District General Hospital in Nanyuki, in central Kenya. The request was initiated through his contact with Dr Lucy Obolensky, a SW orthopaedic registrar who has been providing and supporting medical work in Nanyuki district over the last 12 years. Dr Obolensky had asked for volunteers to make up the team who would plan and fund-raise for a week-long voluntary mission. We are extremely grateful to AAGBI for the award of a travelling grant to support the mission.

The Team

The 2 anaesthetists supporting the mission were

Dr Kerri Houghton Consultant Anaesthetist, Torbay Hospital, Torquay, Devon
Dr Gary Minto Consultant Anaesthetist, Derriford Hospital, Plymouth, Devon

The mission was given some support by the charity MEAK, Medical and Educational Aid to Kenya, a UK based charity which has previously run ophthalmic and cardiac missions to Kenya. This was the first orthopaedic mission that they had supported. Individual team members raised money or self-funded their travel and accommodation and some equipment and MEAK provided support for essential equipment, drugs and the cost of the patients' hospital stay.

Other members of the clinical team were

Mr Robert Lofthouse	Consultant Orthopaedic Surgeon	Torbay Hospital, Devon
Mr Dominic Spicer	Consultant Orthopaedic Surgeon	St Mary's Hospital, London
Dr Lucy Obolensky	Orthopaedic Surgical Trainee	SW rotation
Ms Denise Allcorn	Theatre Sister	Torbay Hospital, Devon
Ms Sarah Bailey	Surgical Nurse Practitioner	St Mary's Hospital, London
Ms Wendy Harvey	Recovery Nurse	Torbay Hospital, Devon
Ms Jo Redfern	Theatre Sister	Torbay Hospital, Devon
Ms Helen Reynolds	Theatre Staff Nurse	Torbay Hospital, Devon
Mr Paul Salter	Operating Department Practitioner	Torbay Hospital, Devon

Administrative support to the team was self-funding gap year student, Lucy Houghton.

NANYUKI



Nanyuki lies in the Laikipia District of central Kenya, dominated by Mount Kenya. Nanyuki General Hospital serves a population upwards of 100,000 people. The majority of people in Nanyuki and surrounding area come from either the Maasai or Kikuyu tribe. Their work relies mostly on farming or local retail, with the average person earning roughly one pound a day.

Without the luxury of a national health service in Kenya, the health care system is very limited and healthcare for most of the population of Nanyuki is nothing more than a wishful dream. Nanyuki General Hospital has 150 beds and 6 doctors attempting to provide care in all specialties. There is one surgeon, Dr Samuel Ndanye, who provides all the general and orthopaedic surgery. The hospital relies on a small amount of government funding to sustain the running costs of the hospital. Patients must therefore contribute to their hospital stay and surgery, with orthopaedics being one of the most costly.

Injuries and fractures go largely untreated as treatment is unaffordable for most. As manual work is the main means to an income, disability can mean a death sentence to these people and their families.

There is a smaller privately funded hospital, Nanyuki Cottage Hospital with 40 beds and one doctor, Dr Abid Butt, who performs all the surgery there. Although these doctors work tirelessly for the benefit of patients in Nanyuki, the sheer volume of patients and lack of resources leaves many patients untreated.

Anaesthesia services in the District Hospital are provided by 3 clinical officers and at the Cottage hospital by one clinical officer. These officers are not medically trained but cover all acute care and anaesthesia duties between them.

They were

- Enock Otieno
- Daniel Kaso
- Fred Onsorian

This orthopaedic mission was the first of its kind to this hospital. The objectives were to

- treat as many patients as possible within the week
- share professional practice
- teach as requested

ORTHOPAEDICS IN NANYUKI

Nanyuki General Hospital supports one general surgical consultant, Dr Ndanye, and one gynaecological consultant. All orthopaedics falls under the remit of the general surgeon. With only one dedicated operating day per week to fit all general and orthopaedic cases in a population size similar to a small UK city, it can be understood why only those with life or limb threatening injuries are treated as a priority. All other orthopaedic conditions must either wait or pay for private treatment. The main orthopaedic pathologies found in Nanyuki fall into three main categories:

Trauma: There is a huge number of road traffic accidents in Kenya and Nanyuki is no exception. The introduction of motorbikes has resulted in a rise in the number of trauma cases, and during the week the team were there, new trauma cases were coming in daily. With little money to pay for healthcare and a shortage of doctors, beds and operating time, few patients ever receive the operations they require to avoid permanent disability.

Infection: Osteomyelitis is a huge problem in the developing world. Delayed presentation and limited antibiotic supply result in deformity or fracture, systemic infection and sinus formation with chronic discharge from the infected area.

Osteoarthritis: Life-long labour is a fact of life for the population of Nanyuki. Without running water, firewood, electricity or food, people must walk miles every day carrying heavy burdens purely to survive. Most occupations involve manual labour without correct equipment. Health and safety regulations are unheard of. Both these factors lead to a huge amount of osteoarthritis, predominantly affecting the hips and knees. Without access to painkillers and mobility aids, mobility and function deteriorates quickly and sufferers are reduced to a life of pain and immobility.

THE WEEK'S WORK

The aim was to relieve the sheer volume of cases by providing as many as possible of these impoverished patients with treatment they would not otherwise receive. The plan was to operate at both hospitals in order to share expertise with both groups of clinical staff. Both hospitals had to be paid for the patients' stay. No patient treated had means to pay for themselves.

On arrival the team assessed the facilities and equipment to determine the capability of the local infrastructure and what it was feasible to attempt during the week. The patients had to be seen and selected for surgery. About 70 patients had been preselected to be seen for opinion on our first day and from these the surgeons had to select the most appropriate cases for surgery over the next 5 days. We then set the week's clinical work plan although this was moderated over the course of the week as further patients were seen and equipment issues were resolved - or not.

THE WEEK'S WORK PLAN (Key: S=Surgeon A=Anaesthetist N/O=nursing/ODP)

Day 1	See patients for orthopaedic opinion and select cases for surgery Anaesthetic pre-operative assessment for those listed for surgery Sort equipment and make up sets for cases Assess anaesthetic equipment, drugs and ward capability	S A N/O O/A
Day 2	Operate General Hospital and Cottage Hospital, ward work, referrals In theatre teaching for local theatre and anaesthetic staff Set up recovery Unit	S A N/O N A
Day 3	Operate General Hospital, ward work, referrals, in theatre teaching	S A N/O
Day 4	Operate General Hospital, ward work, referrals, in theatre teaching	S A N/O
Day 5	Operate Cottage Hospital, ward work, referrals, in theatre teaching	S A N/O
Day 6	Operate General Hospital and Cottage Hospital, ward work, referrals Formal teaching session on acute pain management to Cottage Hospital staff Acute pain management lecture to district-wide medical staff meeting	S A N/O A A
Day 7	ATLS multidisciplinary teaching session Ward work Visit to remote Maasai area, school and rural clinics to see the environment where the patients live and will recover	A,S,N S,A All

Gary Minto and Denise Allcorn spent most of Day 1 in Nairobi locating equipment sent from India which had not arrived by the time the team were due to fly to Nanyuki.

Case selection was a major challenge for the 2 surgeons. Our initial assessment confirmed that local equipment was very limited and practicalities of transport and access to funds had limited the amount we had been able to bring with us. The operating theatre in the General Hospital was large but sterilisation equipment and procedures were archaic, and

there was no access to any imaging in theatre. The theatre at the Cottage hospital was small and both sites had very limited equipment.

The operations we performed consisted of trauma and elective cases. Because of lack of access to treatment, the trauma cases seen were on average three months old, making the operations longer and more technically difficult than would be the case for fresh injuries. Our 'elective' cases were mostly osteomyelitis and straightening procedures for children with severe deformities.

More new patients were seen for opinion during the course of the week.

Meanwhile, the nursing staff had the monumental task of matching up the equipment they had, unpacking and sorting that which we had brought and then sorting them into sets to be packed and sterilised for the first day's operating. Our ODP investigated the anaesthetic equipment. Sterilisation facilities were basic and all was done in the theatre.

THE OPERATIONS

Although many of the patients we reviewed did not receive an operation, they were all overjoyed at their chance to see a specialist surgeon free of charge. Like most patients in the UK, the patients we saw were desperate just to receive a diagnosis and an understanding and prognosis of their condition. This we were able to provide for the patients we saw in clinic, even if they did not proceed to surgery. The following operations were performed and a further 2 patients were going to be operated on using our funds after our departure.

List	Age	Sex	Diagnosis	Operation
1	80	M	Fracture Right Neck of Femur	Right Austin Moore
2	2	M	Left Genu Valgum	Temporary epiphysiodesis
3	89	F	Fracture Right Neck of Femur	Right Austin Moore
4	15	F	Osteomyelitis Left femur	Sequestectomy
5	45	M	Fracture Right Radius and Ulna	Open reduction Internal Fixation with plating
6	25	M	Right thumb fracture dislocation	Arthrodesis R thumb
7	29	M	Extensor tendon laceration - EDC, EPL, EDRL, ECRB	Tendon repair
8	16	M	Right knee dislocation with Salter Harris three fracture tibia	Right knee relocation with open reduction internal fixation right tibia
9	23	M	Fracture left tibia and fibula - mid shaft	Open reduction Internal Fixation with plating
10	60	M	Osteomyelitis left distal tibia	Sequestectomy
11	26	M	Chronic osteomyelitis with associated fracture midshaft femur	Sequestectomy and femoral plating
12	47	M	Fracture right radius and ulna	Open reduction Internal Fixation R Ulna
13	30	M	Comminuted right femoral fracture	Open reduction Internal Fixation with K Nailing
14	26	M	Fracture Left tibia and fibula - mid shaft	Open reduction Internal Fixation with plating
15	13	M	Osteomyelitis Left Distal Femur	Sequestrectomy Left femur
16	90	F	Fracture Right Neck of Femur	Right Hip Hemiarthroplasty
17	30	M	Fracture left ankle - Weber C	Open reduction internal fixation with plating and syndesmosis screw
18	30	M	Fracture left ankle - Weber C	Relocation of syndesmosis screw

ANAESTHESIA

Pre-planning had taken place through liaison with Dr Ndanye to establish anaesthetic facilities, equipment and drug availability. Based on this, a list of necessary or potentially useful drugs and equipment was compiled, including parenteral antibiotics and post-operative analgesia packs. Equipment no longer required by Torbay and Derriford was collected and drugs were generously supplied by Torbay pharmacy. Issues around carriage of DDAs made it difficult to take any of these drugs with us although some midazolam was taken, covered by a letter from the principal pharmacist in Torbay. It was known that there was often difficulty taking anything unusual into Kenya so it was decided not to attempt to take anything with us which might compromise the carriage of the other drugs and equipment we were taking with us.

All patients had had their P24 markers for HIV/AIDS performed and the intention was not to operate on HIV positive patients because of their high likelihood of infection and their limited lifespan and hence potential benefit from the procedure. However, 2 HIV prophylaxis kits were taken for the team's reassurance and protection.

On the first day, a rapid pre-operative assessment had to be made of the patients that the surgeons had selected to operate on and also of the facilities in both hospitals. Many of the patients were unable to speak English or had limited understanding but with the help of nursing staff interpreting, it was possible to make some assessment. The patients were extremely grateful and many had waited a long time for the hope of treatment. One young man who had been selected for surgery was very disappointed as, when examined, he had a bad chest infection which precluded us from operating but we were able to get him seen and treated in a chest clinic.

Both hospitals had a 'modern' anaesthetic machine (Datex-Ohmeda) with ECG, NIBP and pulse oximetry though no capnography or other respiratory gas monitoring. The only vapour available was halothane and the only true opiate available was pethidine although tramadol was also used. Intravenous fluids were available although supplies apparently sometimes ran out. There were no LMAs and the normally used induction agents were thiopentone or ketamine. Spinals were performed whenever possible.

We met the clinical officers who normally administer anaesthesia who were competent in the conduct of both spinals and basic general anaesthesia but limited in other techniques. Although they had tried LMAs, they had not felt confident in their use probably because lack of access to propofol as an induction agent had made insertion more difficult than would normally be experienced. They had limited knowledge of and experience in performing other nerve blocks and were particularly pleased with the teaching material supplied by Abbott in the form of illustrated books, charts and CDs. They were unused to patients who were taking any medications - indeed none of these patients could afford medication so were not taking any at all.

Drug availability was limited and the only vasopressor available was adrenaline. There was no defibrillator.

All lower limb operations were performed under spinal anaesthesia with the exception of one where insertion was not successful. Other cases were performed using LMAs and inhalational anaesthesia.

Blocks demonstrated during the week included

- Subarachnoid
- Axillary
- Psoas
- Radial and median nerve

General anaesthetic cases allowed us to demonstrate the use of drugs and techniques that the Clinical Officers were not familiar with eg propofol induction and LMA insertion.

The concept of a modern anaesthetic chart was introduced and also the principles of recovery as we know it. There were no recovery rooms as we know them and no recovery staff but our recovery nurse was able to set up a recovery of sorts at the General hospital but at Cottage hospital the patient had to be returned directly to the ward.

There was much discussion about the use of opiates for post-operative analgesia with theatre and ward staff. The provision of post-operative analgesia packs (paracetamol, ibuprofen, codeine phosphate) proved to be very helpful in the management of post-operative pain as they could be given directly to patients.

We undertook daily ward rounds to ensure pain was adequately controlled. The wards were basic and some patients had to share a bed but they were well mopped down daily. Linen was washed by hand and hung all around the hospital grounds but at least some priorities were right -this parking 'space' was barely 10 metres from the theatre door!

TEACHING and LEARNING

Teaching played a major role in the project, and was felt by both the home and visiting teams to be an essential part of the mission. All members of the team learned a huge amount from their Kenyan counterparts and were able to return this with some of the western education we have been lucky enough to receive. This accentuated the relationships and sense of teamwork that quickly evolved within the group.

The Torbay nursing staff quickly formed excellent working relationships with the Nanyuki theatre staff and were able to demonstrate the high standards of sterile practice used in orthopaedic operating in the UK. They were able to teach the nurses how to maintain these standards in Nanyuki even without the hi-tech equipment we take for granted.

The clinical officers who administered anaesthesia seemed to greatly value the in-theatre teaching of practical skills and theory as well as the formal sessions and they gained confidence in spinal and regional anaesthesia. An ongoing relationship is anticipated as access to email is not a problem there.

The operations, scrub assistance and anaesthesia were all performed side by side with the Nanyuki staff enabling us to share practice and establish excellent working relationships which we hope will carry on into the future. We were full of admiration for what the staff there was able to achieve with limited facilities.

The two surgeons at each of the hospitals, Drs Ndanye and Butt were very skilled and experienced surgeons but clearly enjoyed exposure to other surgeons and their techniques.

The experience of third world operating to our orthopaedic surgeons was invaluable. They were given the opportunity to treat cases we no longer see in the UK, had to improvise with the equipment available to them, teach a UK trainee in challenging environments and learned new techniques for conditions that we do not see in the UK.

Session team briefings and debriefings incorporating the WHO Safe Surgery checklist for individual patients were demonstrated. The relevance of these processes, recently introduced at Torbay was felt acutely by the UK team in this unfamiliar environment, as patients did not wear identity bracelets, notes were very poor, names were not always clearly identifiable on the pre-op xray, not all patients spoke English and changes in operating list order were sometimes required to enable the correct equipment to be available. Use of the briefings, time-outs and debriefings were all felt to be invaluable in mitigating the risk presented by these major challenges to the safe running of the theatre lists.

Debriefing was held later on when we had returned to the hotel after a tiring first day.

The monthly regional medical meeting was called whilst we were in Nanyuki at which all doctors in the surrounding region meet for an evening of education. Dr Ndanye asked for a formal lecture which would be relevant to all specialties attending, and has selected pain management. This was delivered by Dr Kerri Houghton. It demonstrated that effective pain management is affordable and possible for all patients in Kenya. The talk emphasised that the drugs we use in the UK are no different or more expensive than those affordable in Kenya but that dosage and regularity is key to adequate pain management and suggested a 'pain ladder' relevant to their environment. It was very evident that there is extreme fear of using opiates which resulted in inevitable and unnecessary suffering for patients. This lecture was also delivered to nursing staff at Cottage hospital.

Dr Gary Minto provided an ATLS lecture and demonstration at the weekly multidisciplinary hospital meeting. This again emphasised that despite the lack of first world equipment, by following protocols and performing simple measures good quality ATLS can be provided in Nanyuki.

All teaching was very enthusiastically received.

THE LAST DAY - A VISIT TO THE BUSH

The final day was planned so that we did not operate and leave on the same day. We held a teaching session, went around the wards and then went on a visit to areas where the patients originated from. It was movingly informative. We went inside the mud and stick built huts of the Maasai, with the walls and rush roofs impregnated with years of smoke from the fires they light inside them with no escape for the smoke. Most of them had no possessions at all. The men are largely absent in the day, herding cattle in their pursuit of grazing and water, their striking red clothing visible from afar. The women make beaded necklaces and jewellery which are sold in markets. Families group their huts together in a circle and corral the animals within it at night. Traditions have been very slow to change and education does not reach many of the people. HIV incidence was approximately 8-9% in this area and acceptance of its causes and prevention is very slow.

Our visit took us right out into the bush, close to a Conservation area at Lewa. This is the area Lucy Obolensky knows well, having helped to establish and fund 2 rural clinics there over the last 12 years, so we were privileged to be able to visit these clinics, the bush school and dwellings of local people. Lucy was able to see old friends again.

The provision of free primary schooling and at this particular school, a meal at the end of the day, has boosted attendance massively giving some hope of improvement for the future. Unfortunately the government has recently withdrawn free provision of teaching so this may compromise this small improvement. To reach this remote area we crossed the conservation area and were able to see some amazing wildlife as we drove through.

COSTS

Orthopaedic operating is expensive. The equipment used and prostheses needed make orthopaedics one of the most expensive surgical specialties. For this reason running third world orthopaedic missions is particularly difficult not only because of the funds involved to acquire the equipment, but the weight of both operative instruments and implants to transport to the third world. The expense of orthopaedic operations in the developing world and lack of first world support, paradoxically makes orthopaedics missions to the third world the most highly sought after and essential to these patients.

Nanyuki General Hospital has very little orthopaedic operating equipment, with only one general orthopaedic set. Nanyuki Cottage hospital was better equipped and we would like to thank Stryker USA for their generous donation of a TPR set and Saw enabling the team to perform quicker, higher quality operations throughout the week. However patients presenting to the General or Cottage hospitals would normally still need to provide their own prosthesis prior to their operation being performed. On the salary most patients receive, the sheer cost of the implant would make their operation unobtainable. All equipment and prostheses needed during the mission were therefore brought with us to Nanyuki.

Over £6000 of orthopaedic operating equipment and prostheses, £2000 of anaesthetic equipment, and £700 of pharmaceuticals were brought on the mission. All the above was donated to the hospital, a small proportion was used during the mission, and the rest left for their continued use.

The people we treated were unable to pay for their treatment. We performed free surgery on these patients, paid for their hospital stay and left the hospital £1700 to ensure their continuing postoperative care and medication would be paid for. In addition, 2 further operations were to be performed after we had left by the local surgeons, but paid for with our funds.

THE FUTURE

This first Kenya Orthopaedic Project, supported by MEAK was deemed to be a huge success to all those involved, operatively, educationally and culturally. A very productive meeting with the hospital administrator, Dr Buthe, and the surgeon Dr Ndanye ended the mission. Despite regular letters and emails from other hospitals around Kenya asking for Orthopaedic missions to be run there, we feel we have set the foundations for an ongoing dynamic relationship with Nanyuki hospital. We will therefore endeavour to perform yearly missions to Nanyuki for the foreseeable future. Dr Buthe has kindly agreed that on their part Nanyuki will pay for all patients above the first ten that we operate on during the next mission. In this manner funding for all patients treated on the mission can still be achieved through fundraising from both parties, bringing our working relationship and combined goal for the patients even closer together.

Orthopaedic Projects to other hospitals in Kenya are now clearly achievable, given the success of our first mission to Nanyuki. Mombasa hospital is in desperate need of orthopaedic intervention and, funding permitting, we will run a project to Mombasa Coast General Hospital in November 2009, followed by a return trip to Nanyuki in February 2010.

Trainees and medical students could benefit greatly from taking part in such a mission. Our orthopaedic trainee, Lucy Obolensky who organised the mission gained fantastic experience learning in this environment with supervising consultants as well as developing organisational capability. The same would be true for anaesthetic trainees.

An educational visit to the UK by Dr Ndanye will hopefully be facilitated before the return visit in Feb 2010.

We anticipate ongoing contact by email with our new anaesthetic colleagues.

Other potential for development includes

- the potential inclusion of Physiotherapy/Occupational therapy support
- exploration of the potential for telemedicine links
- sourcing of image intensification etc to extend the range of possible surgery
- specialist paediatric input
- exploration of partnerships for learning and research between individuals in the different disciplines and organisations ?CITEC Torbay
- support for the anaesthetic team to develop their infrastructure to a higher level

Our aim in the future is to perform total hip and knee replacements for those crippled with osteoarthritis. Prostheses and operative equipment for joint replacements come at vast expense in Kenya and the UK, but we believe that with further fundraising this will become possible in future Kenya Orthopaedic Projects.

THANKS

Particular thanks go to the Kenyan team for their welcome and hospitality. The new friendships are greatly valued. In particular, thanks to

Daniel Kaso	Clinical Officer, Anaesthesia, Nanyuki General Hospital
Fred Onsorian	Clinical Officer, Anaesthesia, Nanyuki General Hospital
Enock Otieno	Clinical Officer, Anaesthesia, Nanyuki Cottage Hospital
Dr Samuel Ndanye	Surgeon, Nanyuki General Hospital
Dr Abid Butt	Resident Medical Officer and Surgeon, Nanyuki Cottage Hospital
Charity & Staff	Matron, Nanyuki General Hospital
Gill Pullai & Staff	Matron, Nanyuki Cottage Hospital

Thanks are due to the many individuals and organisations that made the mission possible.

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Stryker USA

Our many individual sponsors whose support has made this mission possible will receive a letter of thanks and a report. We all gained greatly from the visit.

(please see below for a selection of photographs)





