# Integrating podiatric with vascular surgery — the Manchester model. A paradigm shift resulting in fewer major amputations

Naseer Ahmad, Suzanne Taylor, Paul Chadwick, Mark Tagoe and Frank Bowling

Podiatric surgery has been traditionally operating either independently or under the umbrella of Orthopaedic surgery. In Manchester, a new model, where the podiatric surgeon works within vascular surgery, has been developed. While patient comorbidity and types of procedures undertaken are far more complex, 'The Manchester Model' has, within three years, helped reduce the number of major amputations by 23% at the authors' institution. The authors describe this model and illustrate the genuine collaborative nature of the relationship through a case report.

The traditional model of podiatric surgery enables it to be embedded within orthopedics or as a stand-alone unit performing elective foot and ankle surgery as day case procedures with the majority being under peripheral nerve blocks. This model benefits both parties as orthopedic waiting lists can be managed more effectively. In Manchester, a new model has been developed whereby the podiatric surgeon sits within the vascular unit rather than orthopedics. This model has brought significant benefit, not only to vascular and podiatric surgery, but also, and most importantly, the patient.

This model has been facilitated by the close collaboration of the two disciplines and has, to a large extent, been responsible for the reduction in the major amputation rate of 23% over 3 years. In this article, the authors describe their model, the benefit it brings to both specialties and illustrate their integrated nature through a case study requiring shared complex decision making.

# The Manchester Model of Integrated Working

Manchester Royal Infirmary serves a mainly deprived and ethnically diverse population.

Following sub-specialisation of the vascular surgeons, the authors have developed the multidisciplinary 'lower-limb preservation team' - a tertiary referral service for both diabetic and non-diabetic foot patients requiring complex foot revascularisations. While the service receives referrals from across the North West, it mainly serves the population of Manchester and neighbouring Salford. The multidisciplinary lower-limb preservation team encompasses multiple specialties and while the reduction in major amputations results from the 'aggregation of marginal gains', the introduction of podiatric surgery (in addition to high-risk podiatry) has truly revolutionised the service.

The role of the podiatric surgeon is to jointly lead the weekly foot round in hospital, undertake two weekly diabetic foot clinics and take referrals of diabetic and non-diabetic foot problems from across the region in their stand-alone outpatient clinics. The success of the integration is based on the close relationship built upon the mutual respect of skills. This is especially important as many specialist foot procedures have to be performed on patients where the vascular supply is compromised but not sufficient to warrant

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### Key words

- Podiatry
- The Manchester model
- Vascular surgery

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intervention. The decision to operate in such cases is taken jointly.

### Reasons for developing the Manchester Model — the changing nature of foot disease

Although foot surgery and by extension podiatric surgery has sat within orthopedic surgery, the nature of the foot patient, particularly the diabetic and high-risk foot, is changing. The purely neuropathic diabetic foot is becoming less common with the prevalence of neuro-ischaemic ulcers rising. Further, there is now acknowledgement that the number of non-diabetic foot ulcers e.g., those related to peripheral arterial disease is similar to the diabetic population as half of all amputations are in nondiabetics. The number of foot procedures in patients with a normal blood supply e.g., fifth metatarsal osteotomy is therefore falling. A close collaboration with vascular surgeons is, therefore, vital as the number of patients with a compromised circulation is rising, as well as their frailty and surgical needs.

# Benefit of the Manchester Model to Vascular Surgery

There are several benefits of our model to vascular surgery. Firstly, vascular waiting lists are reduced as these procedures are performed on dedicated lists. Secondly, a far greater understanding of foot biomechanics has entered the lexicon of the vascular surgeon and we now understand the importance of principles such as the centre of pressure line and the parabola of the foot. Thirdly, the dedicated podiatric foot list now acts as training opportunities for the next generation of vascular surgeons as they learn these reconstructive principles. They additionally learn techniques not traditionally performed by vascular surgeons, such as tendon reattachments and transfers — all of which help prevent re-ulceration. Ultimately, the Manchester Model has improved the service offered to our patients by having dedicated foot lists performed by a specialist who is also training the next generation of vascular surgeons both academically and surgically.

## Benefits of the Manchester Model to podiatric surgery

The main benefit of being embedded in vascular is the equal and direct input into the shared decision-



Figure 1. Reducing Major Lower Limb Amputations at Manchester Royal Infirmary 2010-2016.



Figure 2. Day 1. A middle-aged diabetic patient with no foot pulses attended hospital with a septic foot. He was taken to theatre the same night to remove the source of sepsis, including the hallux.



Figure 3. Day 2. His angiogram showed no flow beyond his popliteal artery (left) with a normal dorsalis pedis and the plantar artery refilling via a collateral from the peroneal artery (right).

#### Article points

- The Manchester Model has helped reduce major amputations by 23% in three years.
- 2. At its core is collaborative working between vascular and podiatric surgeons.
- 3. While vascular patients are more complex, the surgery is more rewarding.



Figure 4. Day 10. Patient returned to hospital following self-discharge, however, the foot had deteriorated requiring a complex discussion between podiatric and vascular specialties

making process required for our complex patients. As the typical vascular patient has, by definition, compromised circulation, close collaboration between specialties is vital before undertaking foot procedures. Additionally, the nature of procedures is complex with rarer amputations such as hind-foot, mid-foot and forefoot being performed regularly. The podiatric surgeon also has admission rights onto vascular wards with the medical management undertaken by the vascular surgeons, which works extremely well offering a seamless patient journey.

### The Manchester Model in action an example of collaborative complex decision making

To illustrate the collaboration, the authors present a difficult case that highlights the principles behind complex decision making. This patient is young with diabetes with peripheral arterial disease who developed an infection in his right foot. He required an emergency amputation of two digits, which failed to heal. He needed an ultra-distal bypass, which was performed to the medial plantar artery in the foot. He then required a midfoot (Chopart) amputation with the flap brought up to cover as much of the wound as possible. The very edges of the flap necrosed and he required a small debridement. This is now healing. He now needs an integral (skin scaffold) to cover the bone and then a split-thickness skin graft. The decision making was collective and made jointly between vascular and podiatric surgeons.

The complex decisions which this photograph and the angiogram in *Figure 4* illustrate are:

- 1. Do we amputate and if so, at what level
- 2. Do we revascularise and if so, to which artery



Figure 5. Day 10. A revascularisation to the medial plantar artery was performed.



Figure 6. Day 14 and day 20. A Chopart amputation was performed with sufficient plantar skin to close the wound. Unfortunately, there was a little dieback of the flap which required debridement a few days later. The healthy wound is now going on the heal.

The options were:

- 1. No revascularisation and a below-knee amputation
- 2. A revascularisation to the dorsalis pedis and debridement of the wound
- 3. A revascularisation to the dorsalis pedis and a transmetarsal/Lisfranc amputation
- 4. A revascularisation to the medial plantar and a chopart amputation.

The final decision taken was to perform a revascularisation to the medial plantar artery in order to preserve the plantar skin and use it as a flap for a Chopart. This was performed as a two-stage procedure.

This example illustrates the complex nature of the discussions and the surgery performed collaboratively between podiatric and vascular surgeons. Each respects the other's skill and level of knowledge with the crossover of knowledge vital to understand the options. This kind of surgery is neither for the fainthearted, nor those who wish for an easy life. It requires

real integrated working and discussions that are based on mutual trust and respect.

#### Conclusion

The authors believe their Manchester Model of integrated podiatric and vascular surgery is one that should be encouraged in other Trusts. There are several drivers for this, but the rising number of patients requiring podiatric surgery that have vascular compromise will necessitate closer collaboration in the near future. While closer collaboration is inevitable, a fully integrated approach allows the cross-pollination of ideas, techniques and discussions. All these ultimately benefits patient care. The services provided by the authors' integrated team now allows more complex foot procedures to be performed and is, to a large extent, responsible for the reduction in major amputations.

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