

Breaking down the barrier from multidisciplinary to interdisciplinary care

A case study in a high risk foot clinic

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Abstract

This case study examines the importance of an interdisciplinary team approach to wound management in the particular case of a 63 year old man with a high risk foot ulcer. Treatment options and the perceived traditional professional boundaries of the individual health care providers are discussed alongside interdisciplinary approaches to working as a complementary team.

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Introduction

Hibbert *et al.*¹ and Mullins *et al.*² defined the multidisciplinary team as one which allows for each discipline to provide individualised patient care, relatively independent of collaboration, and with minimal direct problem solving. In contrast, the interdisciplinary team shares problem solving.

Planning occurs prior to the delivery of care. Team members maintain discipline specific roles but communicate and contribute specific knowledge to support the input of other team members to the shared clinical problem.

Traditionally, the diabetic foot ulcer is managed by any number of individual health practitioners, such as general practitioners, wound nurse consultants, podiatrists, vascular surgeons, orthopaedic surgeons, nephrologists and orthotists/prosthetists, and often resolves problems with or without a multidisciplinary approach. The experiences of multidisciplinary health practitioners working in isolation show that this can delay communication and successful outcomes for the patient.

However, even the multidisciplinary team working together can fail due to a lack of coordinated care planning and communication. In contrast, the framework for interdisciplinary team work is more strongly geared toward integration and collaboration of services to maximise clinical problem solving.

The following case study highlights the importance of the interdisciplinary team approach for the client to enable improved outcomes in the complex diabetic foot.

Case report

In 1998, a 58 year old male (Mr G) suffered a hypoglycaemic episode whilst driving his car and subsequently had a motor vehicle accident. He sustained a fractured left calcaneum

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which required surgical repair and subsequently developed a non-healing ulcer. Split skin grafting was attempted on three occasions, all of which were unsuccessful in maintaining a healed state. During this time, Mr G developed osteomyelitis of the heel and underwent a partial calcectomy in 2002. The plantar heel area remained ulcerated following this procedure.

In the presence of autonomic neuropathy, the symptoms of hypoglycaemia can be masked; we hypothesised this as the cause of his accident. During his period of care at the high risk foot clinic, his overall diabetes control averaged a HbA1c of 7.5% (Table 1).

The Transport Accident Commission assumed financial responsibility for the ongoing management of the left foot. A private orthotist, a series of private podiatrists and the Royal District Nursing Service (RDNS) had all attempted to communicate with each other at one point in time as to the best means of managing the foot ulcer.

The severity of the foot deformity (Figure 1) and altered gait created a biomechanical anomaly, which required an interdisciplinary prosthetist/orthotist and podiatric approach. Eventually, the private orthotist, under the instruction of the orthopaedic foot and ankle surgeon, believed that no more could be achieved and the patient would be better suited to a planned amputation. The patient did not agree to this and in May 2003, Mr G was referred from a private podiatrist to the high risk foot clinic of Austin Health (Table 2). The Austin Health clinic is staffed with three podiatrists and a prosthetist/orthotist, with a consulting endocrinologist, clinical nurse consultant (wound management), consultant diabetes educator and dietitian (Table 3).

Table 1. Client history.

Client history	
1989	Type 2 diabetes mellitus Peripheral neuropathy (VPT = 0 octals, 10g Monofilament undetected) ABI = 1.1, Palpable regular pedal pulses
1992	Insulin requiring
1998	MVA → fractured calcaneum repair and 3 x SSG → non healing ulcer
2002	Osteomyelitis → partial calcectomy Non-healing ulcer

The interdisciplinary podiatrist/orthotist's initial consultation at the clinic determined that the left calcectomy had resulted in a leg length discrepancy of 5cm and consequently an exaggerated rocker heel strike, increasing both shear and pressure at this site and delaying forefoot loading. The increased shear was responsible for failure of the split skin graft (SSG) and subsequent ulceration. There was copious serous discharge from the wound which caused maceration of the surrounding tissues. At its largest, the ulcer had developed to 6.5cm x 4cm. The ulcer had a red base and macerated minimally hyperkeratotic edges. Traditional methods of offloading the pressure using felt padding only acted like a sponge to the serous discharge, leading to pungency and increasing the maceration.

Management involved a weekly application of total contact casting. Total contact casting provides maximum pressure relief of the plantar ulcer through the entire gait cycle. The leg length discrepancy needed to be accommodated

Table 2. Clinical management.

Clinical management	
2000	Daily Allevyn foam dressing
2000-2003	20mm adhesive felt padding
2002	Bespoke footwear
2003	Total contact below knee casting
2003	Custom (accommodative) foot orthotic
2003	Aircast walker

Table 3. Health practitioners involved.

Health practitioners involved
Orthotist/prosthetist
Endocrinologist
Orthopedic foot and ankle surgeon
RDNS
Podiatrists
Infectious diseases physician
Rehabilitation physician – amputee unit

whilst maintaining pressure relief over the ulcerated site but allowing a functional gait. This was achieved by suspending the limb utilising prosthetic technology (Figures 2-5). This technology allowed alignment in both the sagittal and coronal planes, ensuring a smooth transition through the gait cycle and safe weight transference.

Total contact casting was used successfully for 6 weeks in combination with DermagraftTM [Smith and Nephew]. Recent advances in tissue engineering have culminated in the development of Dermagraft human dermal replacement, a bed of neonatal dermal fibroblasts cultured in vitro on a bioabsorbable polyglactin mesh. Dermagraft is used in the treatment of diabetic foot ulcers. The ulcer had reduced in size to 1cm x 1cm. Plans were underway to develop a walking ankle-foot orthosis to incorporate the prosthetic technology, but were interrupted by the development of *Pseudomonas aeruginosa* infection which necessitated hospitalisation of Mr G for intravenous antibiotic therapy.

P. aeruginosa is an underreported side effect of below knee casting. *Pseudomonas* will develop in those individuals with poor immune responses in the presence of heat and moisture, an environment created by casting. One source of infection reported in the literature is the plaster bucket³. In our case, this was not the scenario as the plastic bucket is lined and then the lining disposed of after each plaster application.

Fourteen days later, Mr G was re-cast with near resolution of the left heel ulcer. *P. aeruginosa* developed again and our patient was immediately hospitalised for 7 days (Figure 6). At this time, Mr G was instructed by the infectious diseases physician not to ever return to total contact casting.

Orthotic management options were investigated through an orthotic and prosthetic team case conference. Skin condition, foot deformity and leg length discrepancy were the main obstacles to achieving a good functional outcome. A hybrid knee ankle foot orthosis and transtibial amputation were the management options. A consultation with the amputee rehabilitation unit was arranged to discuss the process of amputation and rehabilitation so that an informed decision could be made.

Parvin⁴ discusses the positive amputation as an option for every person with diabetes foot disease. Factors influencing the decision include age, mobility, occupation, family, life expectancy, morphology of the foot, vascular status and treatment to date. Amputation should not be regarded as failure to treat in this instance but should be viewed as a long lasting outcome with near normal mobility and little need for further hospitalisation.

At 63, Mr G was no longer working but was heavily involved with training at the local football club. He lived with his wife and daughter and, despite his foot problems, was very socially active. However, after 6 years of his life being controlled by an infected deformed foot, he made an informed decision that a transtibial amputation was a positive step to take in order to regain control of his life. He underwent the surgery in January 2004, without complication, and soon after began the long rehabilitation process of intensive physiotherapy, prosthetic limb fitting, stump management and learning to walk and

Figure 3. Definitive component used for suspending limb and rocker plate.



Figure 1. Foot deformity.



Figure 2. Total contact casting process.



function independently. He has made excellent progress and will ultimately have a satisfactory outcome with a functional, albeit artificial, limb (Figure 7).

Discussion

Traditionally, the roles of podiatrists and orthotists often result in overlapping of professional boundaries. There are often territorial claims as to which profession should be responsible for the provision of foot orthotics⁵. This historical professional disharmony between podiatrists and orthotists has often failed to provide the patient with the complementary knowledge and skills of both professions.

Prosthetists/orthotists and podiatrists have the unique ability to assess the biomechanics and gait anomalies of the lower limb.

Figure 4. Saggital view. Total contact cast suspended in a hybrid orthosis utilising prosthetic technology.



Figure 5. Frontal view. Total contact cast suspended in a hybrid orthosis utilising prosthetic technology.



Figure 6. Pseudomonas infection.



Figure 7. Healed transtibial amputation.



These skills are the foundation of determining the aetiology of the diabetic foot ulcer. Without this understanding, no amount or particular type of wound dressings are ever going to heal this type of ulcer. Offloading the pressure in a dynamic situation is of prime importance.

Our experience demonstrates that podiatrists' and orthotists' skills are, indeed, complementary; this interdisciplinary approach is what we must all strive for, for the benefit of our high risk and other patients. To work effectively in an interdisciplinary team, each member must give up part of their territorial claim for the delivery of best patient care. Above all, our experience has shown us that the most important aspect of working in an interdisciplinary team is respect for each others' skills; this can not commence until each discipline attempts to communicate and understand each disciplines language and focus of delivery. Every member of the interdisciplinary team has something worthwhile to contribute.

References

1. Hibbert E, St. Arnaud S & Dharampaul S. Nurses' satisfaction with the patient care team. *Can J Rehab* 1994; **8**(2):87-95.
2. Mullins LL, Balderson BHK, Saunders N, Chaney JM & Whitley PR. Therapists' perceptions of team functioning in rehabilitation contexts. *Int J Rehab Health* 1997; **3**(4):281-288.
3. Houang ET, Buckley R, Smith M & O'Riordan M. Survival of *Pseudomonas aeruginosa* in plaster of paris. *J Hosp Infect* 1981; **2**:231-235.
4. Parvin S. Do we waste time trying to save some feet: the positive amputation. *Diab* 2003; **6**(2):90-92.
5. Barr E. Who should be responsible for the provision of foot orthoses – the podiatrist or the orthotist? *Aust Pod* 1996; **30**(4):99-102. ■