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Cost benefit comparison of plaster casts and optical scans of the foot for the manufacture of foot orthoses

Craig Payne, *Dip Pod (NZ), MPH*

ABSTRACT

The use of optical scans of the foot as an alternative to plaster of paris casts for the manufacture of foot orthoses is becoming more wide spread. Based on a number of assumptions, this modelling exercise estimates the low and high costs of plaster casts to be $27.94 and $49.60. The costs of optical scans are estimated to be $3.30 to $10.00. The capital costs of optical scans are higher, whereas the consumable costs of plaster casts are higher. Based on this information, clinicians can make better informed choices between plaster casts and optical scans.

Keywords: foot orthoses, optical scans, cost benefit

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Correspondence: Craig Payne, Department of Podiatry, School of Human Biosciences, La Trobe University, Bundoora, VIC 3086 Australia Phone: (03) 9479 5820 Fax: (03) 9479 5784
Email: c.payne@latrobe.edu.au.

INTRODUCTION

Custom made foot orthoses are widely used in clinical practice to treat biomechanical dysfunction of the foot and for pressure redistribution.[1] The traditional approach to custom made functional foot orthoses is to initially take a plaster cast of the foot.[2,3] The use of plaster casts to manufacture foot orthoses is well established and widely used, but has been shown to have some reliability issues.[4] However, despite these issues, reviews of outcome surveys have shown that they are clinically successful.[5] More recently optical scanning of the foot is possible, which reduces the need for some of the disadvantages associated with plaster casts (eg, the time to cast, time to clean up, material and packaging costs).[6] Comparisons of optical scans to plaster casts have only shown minimal differences in shape.[7]

There are cost differences between plaster casts (eg, higher consumables costs for plaster and time costs) and optical scans (eg, higher capital costs), so the purpose of this project is to compare the costs of the two methods.

METHODS

The cost assumptions used in this modelling were determined from checking with five podiatrists known to the author and checking the prices from a podiatric supplier (AK Surgical, Melbourne). Goods and Services Tax was not included in the calculations. A high and low estimate was determined for each cost to allow for differences in business cost structures and practices. A 'time in motion study' was conducted of one experienced clinician and one inexperienced podiatry student to determine the time needed to take a plaster cast of both feet in a supine position, clean up afterwards, prepare the cast and prescription form for shipping. The time taken was considered to start at the time a decision would be made to take the cast until the time the prescription form was completed. It was also assumed that the materials for the plaster casts (plaster material, water bowl, towels, etc) were easily accessible nearby. It was assumed that the cast would be packaged for sending to the manufacturing laboratory at a later time, however the time taken to do this was added onto the time taken for the cast. All times were rounded to the nearest minute. The times taken do not include the admission and discharge of the patient and other time factors, as they are considered to be the same regardless of method used. From the times taken, a high and low estimate of the time was determined. The

Table 1: Costs and assumptions used in the modelling (Australian dollars).

Item	Assumptions	Costs
Podiatrist	A charge out rate of $100/hr (low estimate) to $150/hr (high estimate) is used to cover the cost of podiatrist's time and business overheads. These costs were based on phone conversations with five podiatrists.	$100 to $150/hr
Plaster of paris bandage	It is assumed that one roll of 15cm wide plaster of paris bandage is used and this costs $6.60 ($74 for box of 12 rolls)	$6.60
Packaging and postage	Packaging costs are nil or minimal, as recycled materials are usually used. Postal/courier costs will vary from $1 (local postage) to $5 (interstate courier). These costs were based on phone conversations with several podiatrists.	$1.00 to $5.00 (average = $3.00)

time taken to take an optical scan and prepare the prescription was taken from a 'time in motion study' of a clinician experienced in its use (Foot Health Industries Pty Ltd, Melbourne, Australia assisted with the determination of the optical scan times).

RESULTS

The high and low costs per patient and their assumptions used in this modelling exercise are reported in Table 1. The estimated approximate time taken to take a plaster cast based on the time in motion study for the experienced clinician, inexperienced student and the optical scan are compared in Table 2.

For the purposes of this modelling exercise it is assumed that time for the taking of the plaster casts is from 11 minutes (low estimate) to 16 minutes (high estimate). The estimate used for the optical scan is two minutes. No observation was made of an inexperienced person using the optical scan, so for the purposes of determining the sensitivity of the analysis, another calculation was made at four minutes for the purposes of a high estimate.

Based on the assumptions presented here and the determined costs, it is estimated that the costs for the plaster casts compared to the optical scan are in Table 3. The costs for the plaster cast method vary from $27.94 (lowest estimate) to $49.60 (highest estimate). The costs for the optical scan vary from $3.30 (lowest estimate) to $10.00 (highest estimate).

Table 2: Time comparisons between an experienced clinician and a student.

Activity	Plaster of paris bandage		Optical scan
Clincial experience	Student time	Clinician time	
Preparation (setting out materials, getting water, etc)	2 minutes	1 minute	0 minutes[1]
Taking of the cast	6 minutes	4 minutes	1 minute
Cleaning up afterwards	4 minutes	3 minutes	0 minutes
Preparing prescription form	2 minutes	1 minute	1 minute
Packaging of cast for laboratory	2 minutes	2 minutes	0 minutes[2]
Total	16 minutes	11 minutes	2 minutes

References: 1. It is assumed that the optical scanner is already set up and there is no preparation time.
2. The optical scan is emailed to the laboratory, so this time is minimal.

Table 3: Comparison of costs for plaster cast and optical scans.

	Time	Time costs	Materials and postage	Total
Cast	11 minutes	$100/hr	$9.60	$27.94
		$150/hr	$9.60	$37.12
	16 minutes	$100/hr	$9.60	$36.26
		$150/hr	$9.60	$49.60
Scan	2 minutes	$100/hr	$0	$3.30
		$150/hr	$0	$5.00
	4 minutes	$100/hr	$0	$6.60
		$150/hr	$0	$10.00

DISCUSSION

This cost benefit modelling, based on a number of cost and time assumptions, clearly shows the cost of using optical scans versus plaster casts, from the perspective of the clinician, is substantially lower. The cost for a plaster cast of $27.94 to $49.60 represents a greater cost to the clinician than the $3.30 to $10.00 for the optical scan. The costings do not include the cost of maintaining an internet connection, as its assumed that this is part of the costs of running the business, nor do they take into account the time to boot the computer system as it's assumed that this is turned on at the start of the day and is already available to use. These costs do not include the capital cost of the optical scanner and the results needed to be interpreted in this context. Optical scanners will soon be more widely available in Australia. The capital costs are most likely to be variable, depending on the type and the cost arrangements that suppliers and foot orthotic laboratories are likely to develop. Based on USA prices scanners are up to $15 000 (AUD), but some commercial arrangements may, in some circumstances reduce this cost to the clinician to no cost. Even at these capital costs, the benefit or not of the use of these needs to be decided by individual clinicians based on volume and the cost structures in their practices.

This cost benefit analysis is from the clinician's perspective and does not include the manufacturing laboratory's perspective. As the foot orthoses can be milled from plastic blocks or from wood to make a positive model from the computer aided system without the need to fill and modify the plaster casts, a cost saving from the laboratory's perspective is also possible, however, there will be higher capital costs.[8]

CONCLUSION

Optical scan systems will soon be more widely available for clinicians to consider their use in the place of the traditional method of using plaster casts. This study has provided information to aid clinicians in their business decision making as to the use of these systems in their practice.

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Education is the key – rural is the vehicle

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learn? How do we as health professionals 'teach' our clients to make changes to their behaviour, to understand about their foot condition, to grasp the significance of their foot condition and their general health? We need to understand how people learn to be able to deliver this information. We need to continuously evaluate the learning process to ensure the information is being successfully transferred to the client. Education is the key!

Working with Indigenous people has taught me to re-think 'the talk we talk'. It has forced me to think about their context, rather than what I want to achieve. What is important to them? What changes are they able to make or are prepared to make? How can I tell them my information in a meaningful way? Through the Indigenous Diabetic Foot program I have been able to develop educational resources to assist podiatrists and other health professionals with the management of the Indigenous diabetic foot. The focus of the program is to develop self management foot care skills, the early identification of foot conditions and the screening of diabetic feet to encourage appropriate referrals for high risk feet. The experience gained from the Indigenous Diabetic Foot program has improved the way I deliver podiatric services to my clients in private practice.

Rural practice can drive innovation. Education is the key for strengthening our profession. An excellent knowledge of adult learning is essential for clients to benefit from our expertise.

Jason Warnock
Recipient of the WT Woodhead Award 2007
(see Podiatry Update Bulletin 2007; 3:10)