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TITLE Faster, Smarter, Greener: How 3D-Printed Orthoses are Streamlining High-Risk Foot Management

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ABSTRACT (maximum 450 words. Please use the following or similar headings: Background/Methods/Results/Conclusions)

Background

Custom foot orthoses play a critical role in the prevention and management of high-risk foot pathologies in particular foot ulcers. Traditional orthotic therapy often involves labour-intensive processes such as plaster casting, transportation of materials, access to workshops and multiple specialist appointments with a podiatrist or orthotist. An innovative approach using 3D-printed custom orthoses has demonstrated equivalent accuracy and reliability to conventional methods, with improved time efficiency and reduced material waste.

At a high-risk foot service in metropolitan Victoria, an internal audit highlighted inefficiencies in the existing model of orthotic service delivery, with treatment delays largely attributed to limited orthotist availability. In response, a new model of care was developed to upskill podiatrists in the assessment and prescription of 3D-printed orthoses. This service redesign aims to streamline access to orthotic therapy, minimise treatment delays, enhance service efficiency, and support sustained ulcer remission through timely, patient-centred interventions.

Methods

A two-pronged evaluation methodology was employed in this study. The first component involved a comparison of both cost and time associated with orthotic therapy, contrasting the traditional standard of care delivered by the orthotic department with a 3D-printed orthotic model provided by the podiatry department. The second component comprised a survey administered via REDCap to podiatrists working within the high-risk foot service. This survey aimed to capture clinicians' perspectives on the feasibility, confidence, and clinical decision-making related to the early initiation of custom orthotic prescriptions through the 3D-printed orthotic service model.

Results

The 3D-printed orthotic model was found to be more cost-effective due to reduced resource utilisation; clinician time, fewer appointments, and elimination plaster casting materials and associated waste. Additionally, the model demonstrated improved service delivery timelines by enabling same-day or next-day device prescription and reduced reliance on orthotist availability. Survey results showed that podiatrists reported increased confidence in the use of 3D orthotic technology. They also agreed that new service model improved patient flow, reduced delays in orthotic provision and allowed greater capacity for complex offloading assessments within the high-risk foot service.

Conclusions

Integrating 3D-printed orthoses into the high-risk foot service through a podiatrist-led model of care offers a sustainable, cost-effective alternative to traditional orthotic therapy. This approach not only improves service delivery timelines but also supports staff upskilling and reduces material waste. The streamlined pathway enables faster patient access to essential devices, which is critical in maintaining ulcer remission and preventing complications. The findings support further implementation and scaling of 3D orthotic technology as part of an innovative, evidence-based care model for high-risk foot patients.