Digitising the Process of Customised Insoles for Diabetic Foot Ulcers

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Mission Statement

- Project aim: To improve the turnaround time (TAT) for fabrication of customised offloading insoles from 3 weeks to 2 weeks in order to enhance diabetic foot ulcer healing
- Stretch goal: To improve this TAT to 1 week
- Patient cohort: Patients with an active diabetic plantar foot ulcer
- Include time frame for completion: May 2018 to September 2018
- Project is consistent with organisation (Better people, better care, better community): Innovation enables our staff to adopt and integrate latest technology to our work process; thus putting them in the forefront of digital transformation. This digital transformation would create better value, delivery and quality of care for patients.
- Department's strategic aim: To deliver value-added care to patients

Team Members

	Name	Designation	Department
Team Leader	Cheong Keet Yeng	Senior Podiatrist	Podiatry
Team Members	Cheng Ren Qin Leighton	Senior Podiatrist	Podiatry
	Michelle Lai Shi Eu	Senior Operations Executive	AHS&P
Facilitators	Melissa Phua	Assistant Head of Podiatry Service, Principal Podiatrist	Podiatry
	Khalid Anuar	Head of Department	Foot Care & Limb Design Centre

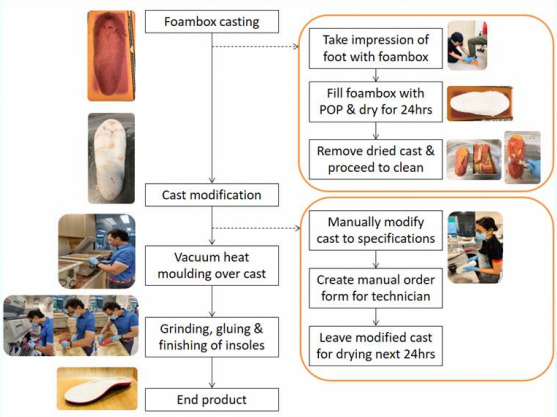
Evidence for a Problem Worth Solving

- Customised offloading insoles reduce excessive pressures over diabetic plantar foot ulcers to ensure optimal healing of the wound
- However, customising this offloading insoles requires a long, manual and labour-intensive process

Current Performance of a Process

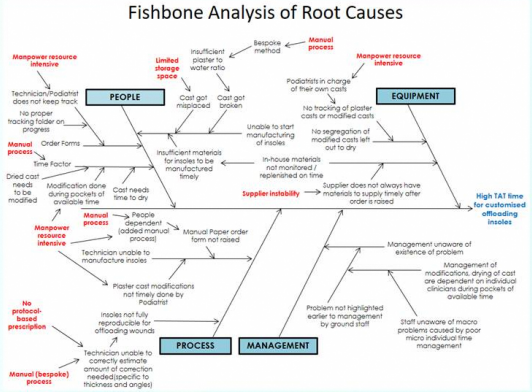
- Mean TAT is approximately 3 weeks. If therapeutic outcomes from offloading are not achieved earlier, wound deterioration may occur
- Need for re-work if plaster casts are damaged or misplaced

Flow Chart of Process

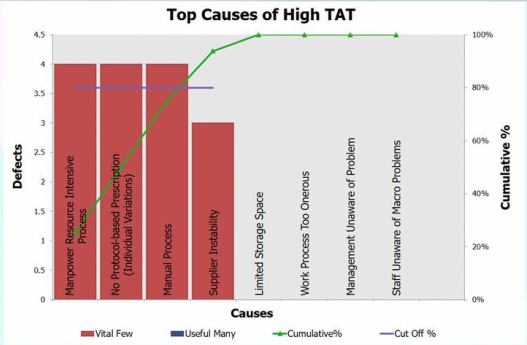


Cause and Effect Diagram

Fishbone Analysis of Root Causes

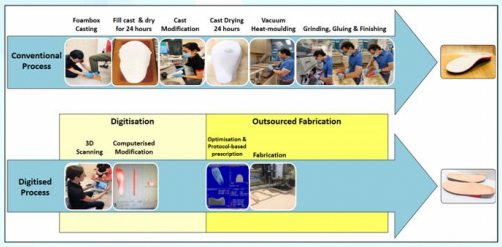


Pareto Chart



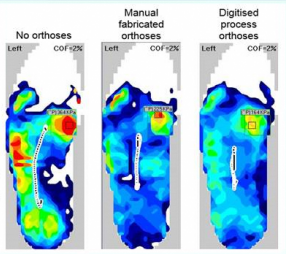
Implementation

PROBLEM	INTERVENTION & DATE OF IMPLEMENTATION
Conventional process which is resource-intensive was not able to cope with high workload and the need for shorter TAT	1/8/2017: We adopted available technology of an iPad 3D-scanner and digitized our work process through innovation. We worked closely with an industry partner for a protocol-based prescription



Results

Average TAT for customised offloading insoles before (conventional methods) & after (digitisation)



1. The TAT improved from an average of 20 days to 7 days
2. The digitised process with 3D-scanning and protocol-based prescription showed significant superiority to the manual handcrafted process in reducing peak pressures for offloading
3. Digitisation has disrupted the conventional process. iPad 3D-scanners & protocol-based software can now be used remotely at any location / settings without need for a resource-intensive setup or support

Cost Savings

- Accelerated wound healing translates to cost savings for patients in terms of medical care and earlier return to work
- Manpower savings
- Eliminated need for re-work if plaster casts get misplaced or damaged
- Savings on material wastage (Foam boxes, forms, plaster of Paris, raw materials)
- Eliminated need for storage space of plaster casts and raw materials

Problems Encountered

- Initial apertures created in the digital scans/files to offload the ulcer site did not correspond to the ulcer location when patient weight-bears. This lead to a delay in dispensing the customised offloading insoles if the podiatrist was unable to remedy the device on the spot. We have overcome this problem by working with our industry partner and re-adjusting the protocol-based prescriptions/instructions

Strategies to Sustain

- The successful digitisation process of customising offloading insoles for diabetic patients with active plantar foot ulcers has been a **standard practice** for the past 1 year
- **Clinical Indicators** are tracked for these group of patients
- There is constant engagement with our industry partner for the **quality & accuracy** of the fabricated devices
- **Cost** of outsourcing and technology is minimal due to savings to manpower costs/time, materials and re-works. Digitisation has further added **value** to patients in terms of quality and TAT
- There are plans to procure more iPad scanners to reduce the time taken to obtain foot scans