**Service Priorities and Programmes**

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# Application of 3D Printing in Splints and Assistive Devices in Occupational Therapy

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## Introduction

3D printing refers to a computerized controlled process developed in the 1980s to create a 3D object. Until recently, this technology has become accessible and inexpensive for application in healthcare services.
Design and prescription of splints and assistive devices for daily activities is always one of the core expertises in the profession of occupational therapy(OT). Utility of 3D printing could be beneficial for designing and fabricating splints and aids in various aspects.
A 3D printer was introduced into the Department of OT of Prince of Wales Hospital in 2016 and utilized in clinical services since 2017.

## Objectives

The major objectives of applying 3D printing technology in OT are to improve the quality of splints and assistive devices prescribed to patients, and to increase the efficiency of service provision.

## Methodology

Fusion 360 by Autodesk Limited was used to design splints and assistive devices. Makerbot Print by Makerbot Industries was used for the slicing process to generate printable file formats. Makerbot Replicator 2x by Makerbot Industries was used for printing splints and assistive devices.

## Result

Trial fitting of 3D printed Capener splints have been conducted on two patients. Compared with conventional handmade splints, these two patients reported higher tolerance to 3D printed splints but weaker passive finger extension experienced.
As poor hand function is a common problem among patients with renal diseases, a 3D printed assistive device has been designed for patients who need to undergo peritoneal dialysis regularly. One patient was prescribed with the device.
Other 3D printed products currently under development include hinges of elbow hinged brace and writing aids.
Application of 3D printing technology has brought multiple benefits to service

provision of OT. As less manual work is needed for fabrication of splints and assistive devices with the help of 3D printer, more manpower could be allocated to other clinical duties on the other hand. Moreover, customized splints and prototype of splints can be produced rapidly with minimal design limitation and lower cost for clinical trial and service improvement. The ultimate goal of developing this technology is to produce 3D printed splints and assistive devices with quality comparable to, if not exceed, those manually fabricated. To attain this goal, it is fundamental to further modify the designs of 3D printed products. Continuous trials on patients are also essential to obtain valuable feedback for improvement.