Digitising the splinting process using computer aided design and additive manufacturing

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Digitising the splinting process using computer aided design and additive manufacturing

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The splinting process is considered a very challenging and demanding activity, requiring a considerable amount of skill, clinical expertise and creative prowess in order to design and fabricate splints which suit the patient, their condition and their lifestyle. However, patient adherence is often low due to factors such as perceived social stigma (Veehof et al, 2008), poor fit (Fess and Philips, 1987) and hygiene issues (Sandford et al, 2008). With the goal of overcoming these weaknesses, the investigators explored a different fabrication process for splinting; Additive Manufacturing (AM). More commonly referred to as three-dimensional (3D) printing, AM is a layered manufacturing process where materials are joined layer by layer to form a physical artefact. The key benefit is the ability to make almost any object, regardless of complexity, and, therefore, ideal for creating custom-made products (Campbell, 2006). In the context of splinting, more complex design features may be delivered to make further customisation of wrist splints a reality by circumventing or even eliminating current weaknesses. However, in order to provide these freedoms, a suitable supporting Computer Aided Design (CAD) software is required to create 3D virtual forms, which could then be fabricated using AM. It is acknowledged that the time of clinical practitioners is extremely valuable and limited. Therefore, a specialised CAD software for splinting practitioners has been developed, to design splints for AM. The software prototype was evaluated by ten splinting practitioners within the United Kingdom; two physiotherapists and eight occupational therapists. User trials and interviews relating to the software prototype were performed. Procedures complied with the Loughborough University’s Ethical Advisory Committee requirements. Results concluded that the digitised splinting approach is a welcome and feasible intervention, with scope for further development to overcome adherence issues.

References

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