Using 3D Printing and Computer-Aided Design to Enhance Patient Education

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Introduction

The accessibility of three-dimensional (3D) printing provides physicians with the opportunity to fabricate tools customized to individual patient needs. Through the use of computer-aided design (CAD) software, prints may be reused and shared among the medical community, expanding the 3D knowledge base. Podiatric medicine has embraced this technology to provide specialized patient care in many areas including the production of surgical equipment and orthotic insoles. Moreover, patient education benefits from this technology as educational models and molds have become reasonably inexpensive to print and distribute.

Abstract

From teaching correct medication application to practicing proper nail cutting techniques, printed models provide patients with a unique learning experience. As an example of the utility and benefit of 3D printing, a short study was conducted to determine whether interactive 3D models and CAD do in fact facilitate patients understanding of medication directions. The sample patient group (n = 35) of both men and women ranging from college students to professional educators was asked to assess the clarity of simple written instructions versus the clarity of medication instructions provided by 3D printed models. The results provided with the 3D/CAD models resulted in a significant increase in understanding of medication directions compared to written instructions in the sample patient population. This new modality in patient education shows promise in promoting podiatric health and wellness in children and adults alike.

Methods

Sample

Survey

Assessment

Self-Reported Understanding

Medication Inquiries

Patient Demographics

Ethnicity

Sex

Physician Instruction

The majority of patients report no instruction from their healthcare provider during appointments.

Patient Education

The sample group that received medication instructions by both written and illustrative means maintained a higher adherence than those directed with text alone.

Results

Patient-Reported Understanding

The Wilcoxon sign-ranked test showed significant difference (p < 0.05) in patient understanding when given directions regarding nail care and application of nail lacquers.

Acknowledgements

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References

² Adapted from Singh, B., & Pemsingh, R. (2015). Lower Extremity Anatomy (1st ed., (Revision 2)).