Potential Applications of Three-Dimensional Printing in the Hospital Network: An Exploratory Study

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Potential Applications of Three-Dimensional Printing in the Hospital Network: An Exploratory Study

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INTRODUCTION

Three-dimensional (3D) printing is a process of additive manufacturing that produces physical 3D objects from digital 3D models or other electronic data sources. Common materials used for 3D printing include ABS plastic, PLA, nylon, titanium, steel, ceramics, wax, and other resins. Advancements in 3D printing technology have allowed for increased integration into the healthcare industry, specifically the surgical arena. The purpose of this study is to explore and evaluate the potential benefits of investing in an on-site 3D printer for use by LVHN.

METHODOLOGY

Preliminary Research
Determination of where and how 3D printing is being used in healthcare currently.

Individual Interviews
A total of 8 unstructured interviews with physicians and other hospital staff were conducted to identify cost-effective applications that could be implemented into the network.

Electronic Survey
Using information gathered from the interviews, a 3 question survey was created and administered to 190 physicians in the Department of Surgery via email.

Patient Case Printing
With patient consent (HIPAA media release form), the standard 3D printing process was followed to produce a prototype skull model at LVPG Plastic and Reconstructive Surgery. A vendor company was used to print the model.

RESULTS

3D printing would be a valuable tool to LVHN in three primary areas of application:
1. 3D model production for preoperative planning
2. 3D model production for surgical simulation training and education
3. Medical device prototyping

Survey results indicate that LVHN physicians view 3D printing technology as a potential asset to their clinical practice. Nearly three-fourths of participants have ideas for implementing a 3D printer into their practice currently.

DISCUSSION

Survey results indicate that LVHN physicians view 3D printing technology as a potential asset to their clinical practice. Nearly three-fourths of participants have ideas for implementing a 3D printer into their practice currently.

CONCLUSIONS

1. 3D printing technology would be beneficial to LVHN.
2. An on-site printer would be utilized by health network personnel.
3. On-site printing is more cost-effective than vendor printing long-term.
4. Further educating hospital staff on the capabilities of 3D printing technology would allow for enhanced profitability.

REFERENCES