A Narrative Review of 3D Printing in Cardiac Surgery

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Disclosures

No relevant disclosures
3d-Printing belongs to a field called additive manufacturing

Computer controlled assembly — piece by piece or layer by layer

Many different technologies

Allows novel design concepts

Austin @3dMedLab
- In-house medical 3d printing laboratory
- Clinician run, Cross discipline
- Teaches 3d imaging, segmentation, modelling, visualisation and printing
- Promotes 3d-medical research
- Pursues low-cost technologies
Aim and methods

Prior analyses by our group — Significant growth in 3D Printing related publications

Cardiac Surgery literature is small — Why?

Is this a research opportunity?

Literature search:
- Ovid Medline -> “Printing, Three-Dimensional” AND “Cardiac Surgical Procedures”
- Ovid Embase -> “Three-Dimensional Printing” AND “Heart Surgery”
- PubMed -> “Three Dimensional Printing” AND “Cardiac Surgery”

Thematic analysis performed
27 papers identified for analysis

Pre-operative planning: 24 papers
Intra-operative reference: 5 papers
Education: 4 papers
Post-procedural analysis: 1 paper
| Applications in adult patients | Key benefit is showing complex anatomy
These predominate in children |
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<td>Surgical prostheses/implants</td>
<td>Is there no demand? Too expensive?</td>
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| Technical specifications, techniques and protocols | Is the technology too complicated? Slow?
Are surgeons not “nerdy” enough? |
| Non-commercial, clinician-run 3D printing facilities | Technology so far has been dominated by non-medical industrial players |
| Patient and trainee education | Not enough critical mass? |
| Surgical simulation for task training | Are existing simulators good enough? |
Conclusion

Literature of 3D printing in cardiac surgery is limited

This technology has potential uses and benefits to all areas of medicine

We encourage others to consider 3D printing in their practice and invite discussion regarding its use from other centres