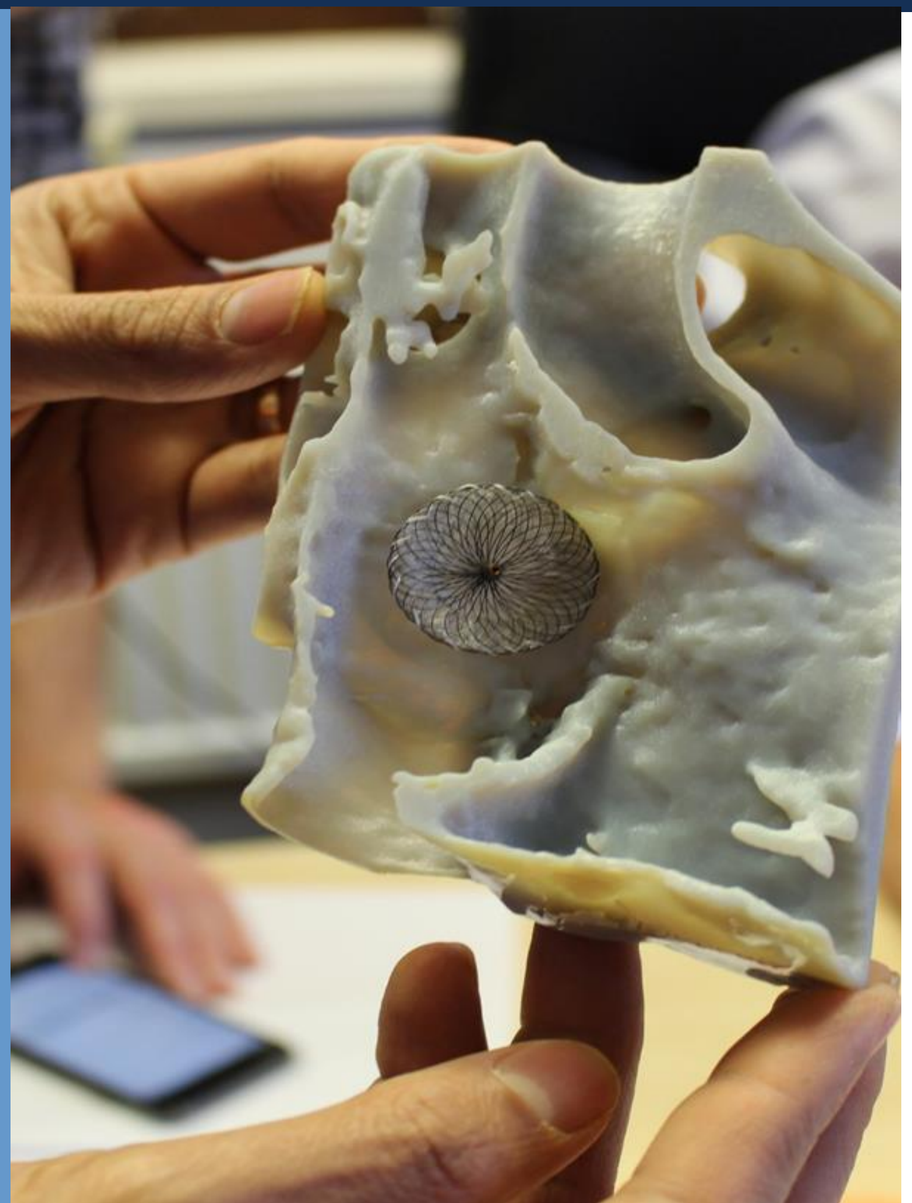
Medical 3D Technologies – Health Economics

The clinically proven benefits of using medical 3D technologies for improving patient outcomes are clear.

What is not clear are the **financial benefits of using medical 3D technologies** in order to reduce operational expenses for your institution.

3D LifePrints, a global leader in the provision of Point of Care Medical 3D printing products and services, have collected **clinical and health economic data over the past 7 years for thousands of cases**, covering all major surgical disciplines.

This short pack will provide your institution with an **insight into key financial indicators** as to how to form a **business case to cost effectively utilize medical 3D technologies**.



Financial Benefits

- Avoidance of surgical procedures
- Reduction in invasive surgery
- Reduction in theatre time/increase in scheduled surgical lists
- Reduction in custom implant use

Use Case Examples

- Pre-surgical assessment
- Cardiac device sizing e.g. stents
- Pre-op orthopaedic implant sizing
- Surgical guides for orthopaedic, oncology & CMF surgery
- Custom CMF implants

Financial Saving 1:
Avoidance of Custom Implants

> *Being able to visualise and feel the defect was hugely helpful to planning reconstruction … minimised the need for alternative implant options.*
>
> **Orthopaedic surgeon, Mr. Hiren Divecha, Wrightington Hospital NHS, UK**

The correct implant can transform a patient's quality of life and **trialling devices before surgery can be extremely beneficial for a surgeon's procedural plan.**

Simulation with our patient specific models can give surgeons the confidence that an **off-the-shelf implant is suitable** and will **drastically reduce costs** for the hospital by **avoiding expensive custom implants.**

In our real-world study of 70 cases, **savings of ~$400,000 were achieved through the avoidance of 14 customised implants**.

Case Study 1 – Acetabular Reconstruction

This patient required acetabular reconstruction due to a peri-acetabular defect and surrounding bone loss.

3D LifePrints' model allowed surgeons to simulate different reconstruction options in their assessment stage.

Trialling implants prior to surgery allowed the surgeon to choose off-the-shelf implants rather than using costly bespoke devices.

Case Study 2 – Total Hip Replacement

This patient needed a second stage revision for a total hip replacement.

Using 3D LifePrints' model, the surgeon required only 5 minutes with implant trial components to formulate a definitive surgical plan, including best locations for fixation screws.

The surgeon established off-the-shelf implants that were available at the hospital would be suitable and therefore did not need to have expensive custom implants manufactured.

Financial Saving 2: Avoidance of Surgical Procedures & Re-intervention

> *In this case, we were able to use the 3D model of the cardiac defects to make the decision that it was possible to avoid further patching of the perforations.*
>
> **Cardiac surgeon, Mr. Rafael Guerrero, Alder Hey Children's Hospital NHS, UK**

Every surgery involves some form of trauma to a patient and a cost to the hospital. A key question to ask is "**can a procedure be avoided completely?".**

Patient-specific 3D virtual or printed models used for surgical assessment can help surgeons make this decision with greater certainty.

The patient avoids an invasive operation and recovery time, while the **hospital benefits from savings from a cost, time, and resource perspective.**

In our real-world study over 70 cases, **43% of further orthopedic surgeries** were avoided with the use of 3D technologies.

Case Study 1 – Complex Ankle Surgery

This surgery required a difficult series of angled cuts that the surgeon had pre-simulated with 3DLP's models in their embedded Hub. The surgery lasted for 2.5 hours instead of 3.5 hours – this hour saved is critical for the tourniquet which can only be left on for a maximum of 3 hours.

A surgery that extends beyond 3 hours is split into a 2 stage procedure, which in this case a subsequent surgery was avoided entirely. The patient in turn had a measurably improved outcome.

Case Study 2 – Septal Defect Patching

A paediatric patient presenting with ventricular septal defects required multiple surgeries to correct this congenital heart defect.

3D LifePrints produced a patient specific 3D printed model based upon the volume of blood within the heart's chambers rather than the heart itself.

The patient benefited from the avoidance of additional surgery.

Financial Saving 3:
Reduced Theatre Time & Increased Surgical Lists

> *Using the 3D model, we identified oesophageal involvement and avoided oesophageal injury/capsular breach.*
>
> **Spinal surgeon, Mr. Jeremy Reynolds, Oxford University Hospitals NHS, uk**

Hospitals around the world face mounting **surgical backlogs**.

3D patient-specific anatomical models and surgical guides can help surgeons find and plan more efficient surgical routes that translate to less time in planning and in theatre e.g in orthopaedic and osteosarcoma surgeries.

These time savings, achieved over a period of time by using our medical devices, can enable **Theatre Managers to effectively plan and increase surgical lists.**

Our real-world study of 70 cases allowed the host institution to increase their yearly number of surgeries (~3,254) **by 10% with the surgical time savings.**

Case Study 1 – Hip & Knee Surgery

In an orthopaedic 3D study conducted at Wrightington Hospital NHS, a review of 50 hip and knee primary revision surgeries in which 3D patient specific anatomical models were used demonstrated significant time savings.

By using 3D models, a reduction of 25% in surgery time over an average of a 2 hour surgery was realised.

Case Study 2 - Hemicorporectomy

A patient diagnosed with a highly malignant pleomorphic sarcoma in their pelvis required a resection.

Planning this hugely complex surgery with the model meant safe tumour resection margins were determined prior to surgery.

This resulted in greater tissue preservation and hours saved in surgery in a procedure involving 7 surgeons over a 36 hour period.

Financial Saving 4:
Minimise invasive surgery choices

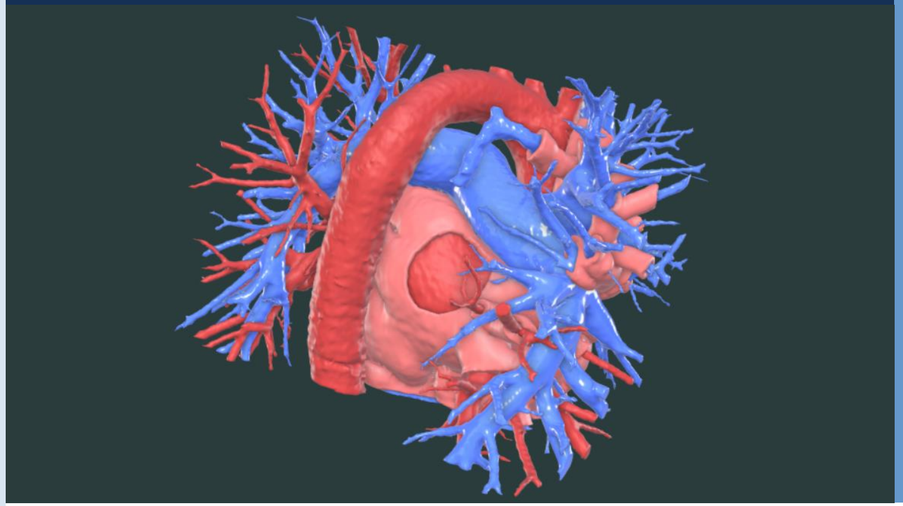
> *The use of the 3D model avoided the use of further surgical dissection and bone cuts.*
>
> **Orthopaedic surgeon, Mr. Duncan Whitwell, Nuffield Orthopaedic Centre, Oxford**

Is complex, traumatic, and expensive surgery really the best option for the patient? Can a more effective pathway be found?

Our virtual and physical patient-specific products and services can help surgeons **find and plan the most minimally invasive treatment** for their patient.

For the hospital, minimal invasion treatment pathways can mean a **less costly procedure** through a reduction in resource use and possible risk to the patient.

Use of a cath lab over open heart surgery can save $20,000+ per procedure.

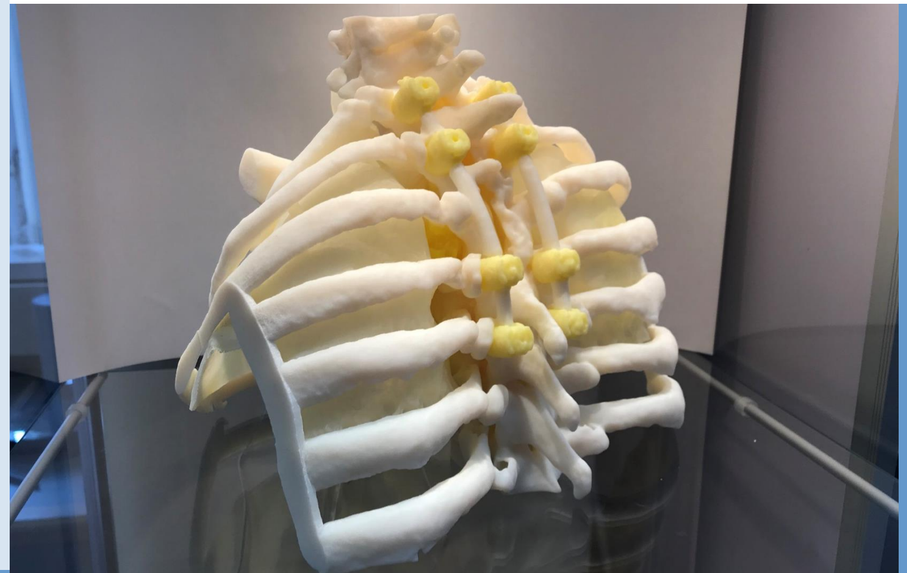


Case Study 1 – Interatrial Septum Abnormality

This patient suffered from a superior sinus defect with an anomalous pulmonary vein.

3D LifePrints provided a patient-specific virtual heart model for surgical assessment.

As a result, the surgeon chose to use a cath lab procedure over open-heart surgery.



Case Study 2 – Spinal Chordoma

This patient required a complex resection for the removal of a spinal chordoma.

This model made it clear to the team how close the tumour was to the oesophagus.

An oesophageal surgeon's assessment resulted in the surgical entry site being altered; increasing procedural accuracy and decreasing risk to the patient.

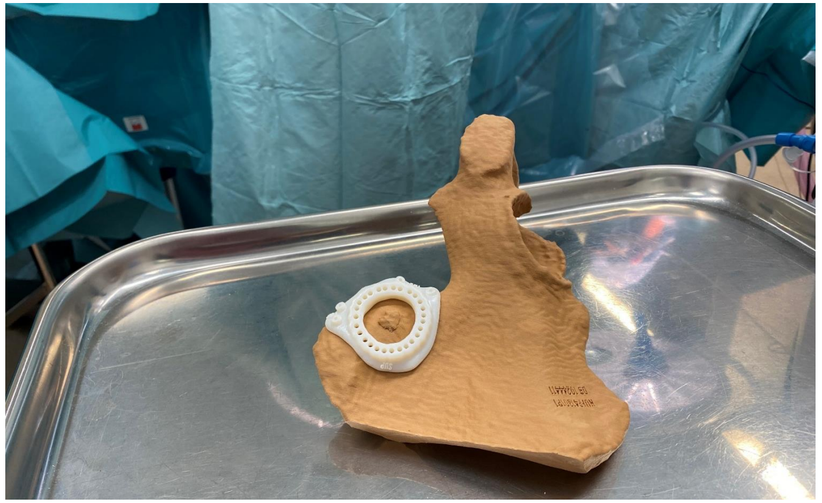
Case Study - Multiple Savings
Oxford University NHS Tumour Team

Often, savings from 3D solutions compound together and more than one can be recognised by the surgical team, as is the case with the Oxford University Hospital NHS Trust's Tumour team.

"We, as a Tumour Team, would be hugely enthusiastic of making more use of these models"

There are several reasons;

- The presence of the guide allows more accurate localisation of the tumour meaning that the operative exposure is less; the risk of damaging nearby structures is less (which also has the knock on effect of reducing post surgical complications and therefore litigation) and the tumour resection is more precise
- Less exposure means patients recover quicker and therefore should go home quicker
- Surgical time is reduced meaning that an additional case can potentially be added to the list
- The return to theatre rate for a positive margin (where the tumour has been incompletely resected) should be less. "



"Superb to have the design engineers embedded in our hospital. Very responsive and ended up with a model that really accurately reflected our patients' pathology which was of huge assistance both intra-operatively and for pre-operative consenting and discussion."

Consultant surgeon, Mr. Tom Cosker,
Oxford University Hospital Foundation, NHS, UK

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