



Western Cape
Government
FOR YOU

Health and Wellness



HEART TRANSPLANTATIONS

Presented by:

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INTRODUCTION

On December 3, 1967, Dr. Christian Barnard performed the world's first successful human heart transplant at Groote Schuur Hospital in Cape Town, cementing South Africa's place in medical history.

Today, Groote Schuur Hospital stands as a premier public sector referral centre, deeply committed to clinical transplantation, donor management optimization, and organ preservation innovation.

NATIONAL TRANSPLANT ACTIVITY DATA

PERIOD	TRANSPLANT ACTIVITY METRICS	STRATEGIC CLINICAL CONTEXT
Year 2000	41 Heart Transplants	Peak activity year recorded nationwide.
Year 2016	25 Heart Transplants	Reflect s a 40% reduction from the peak in 2000.
Until 2003	489 Cumulative Transplants	Total volume spanning the first 36 years of the program.
1997 - 2019	130 Transplants Performed	Specific cohort database listed at Groote Schuur Hospital.

South Africa faces a dire shortage of organ donors, particularly for heart transplants, with a 40% decrease in heart transplants since 2000. Less than 400 transplants (all types) were performed nationally in 2016.

NUMBER OF HEART TRANSPLANTS PERFORMED ANNUALLY

South Africa remains relatively low compared with developed countries.

- Donor shortages
- Healthcare resource constraints.

Current estimates suggest:

- Approximately 15–30 heart transplants are performed annually.
- Combined public and private sector activity contributes to the national total.

Waiting-list mortality remains significant:

- Limited donor availability.

But the true numbers are unknown, and the only way we know of a possible recipient is when they are listed to be transplanted as a P2 case.

SOUTH AFRICA: MAJOR TRANSPLANT CENTRES

The current transplant centres in South Africa are split between the major 3 provinces namely Western Cape, Gauteng, and KwaZulu-Natal.



Note: Locations are their current coordinates and view their sector details

Source: Interactive Geographic Directory (Google Maps)

CHALLENGES

Organ Donor Shortages

- Most significant limitations
- Approximately 40% decrease
- Shortage of suitable organ donors
- Historically, up to 50% of recipients died on waiting list

Referral Delays

- Approximately 75% referred are deemed unsuitable
- Often referred too late
- Consequences for late referral:
 - Severe pulmonary hypertension
 - End-organ dysfunction
 - Right ventricular failure
 - Prolonged mechanical circulatory requirements
- Reduces transplant eligibility and worsens outcomes



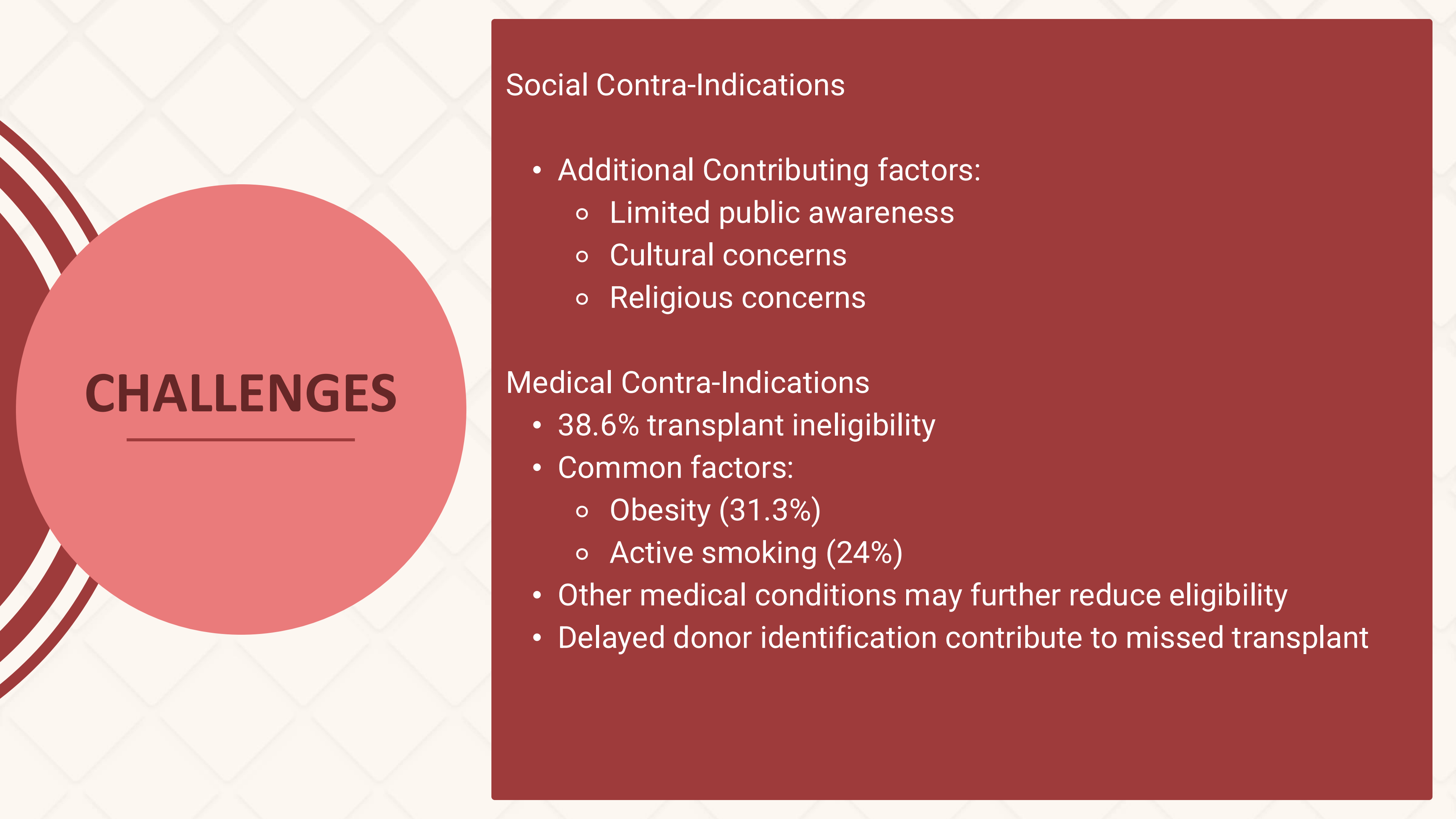
CHALLENGES

Resource Limitations

- ICU capacity
- Financial constraints
- Scarcity of transplant coordinators
- Geographic distance between donor & recipient
- Logistical challenges during procedure
- Limited access to mechanical circulatory support devices
- Mechanical assist devices largely available in private sector
- ECMO services (more popular and readily available)

Social Contra-Indications

- 49.3% deemed ineligible
- Factors include:
 - Poor social circumstances
 - Limited insight into condition
 - Poor treatment adherence and compliance



CHALLENGES

Social Contra-Indications

- Additional Contributing factors:
 - Limited public awareness
 - Cultural concerns
 - Religious concerns

Medical Contra-Indications

- 38.6% transplant ineligibility
- Common factors:
 - Obesity (31.3%)
 - Active smoking (24%)
- Other medical conditions may further reduce eligibility
- Delayed donor identification contribute to missed transplant

SURVIVAL RATES AND OUTCOMES

SURVIVAL TIMELINE	NATIONAL SA AVERAGE	INTERNATIONAL STANDARD
1-Year Post-Op	85%	85% — 90%
5-Year Post-Op	75%	70% — 80%
10-Year Post-Op	70%	60%

TYPICAL DONOR CHARACTERISTICS

1

DONOR IDENTIFICATION

- Brain-dead donors
- Age generally < 55 years
- Acceptable ischemic time
- Death classification:
 - Donation after Neurological Death
 - Donation after Circulatory Death

2

IDEAL CRITERIA

- Normal ventricular function
- Minimal inotropic support
- No significant coronary artery disease

3

DONOR ASSESSMENTS

- Echocardiography
- ECG
- Troponin levels
- Coronary angiography (selected)
- Hemodynamic evaluation

Brain death produces significant endocrine and hemodynamic changes requiring aggressive donor management.

IMPORTANT DONOR FACTORS INFLUENCING SURVIVAL

Significant Influence on Survival

- Inotropic Support
88%
- Smoking History
25%

Non-significant Influence

- Diabetes
- Hypertension
- Hepatitis B/C
- Smaller Donor BSA

Decrease Survival in Pediatric

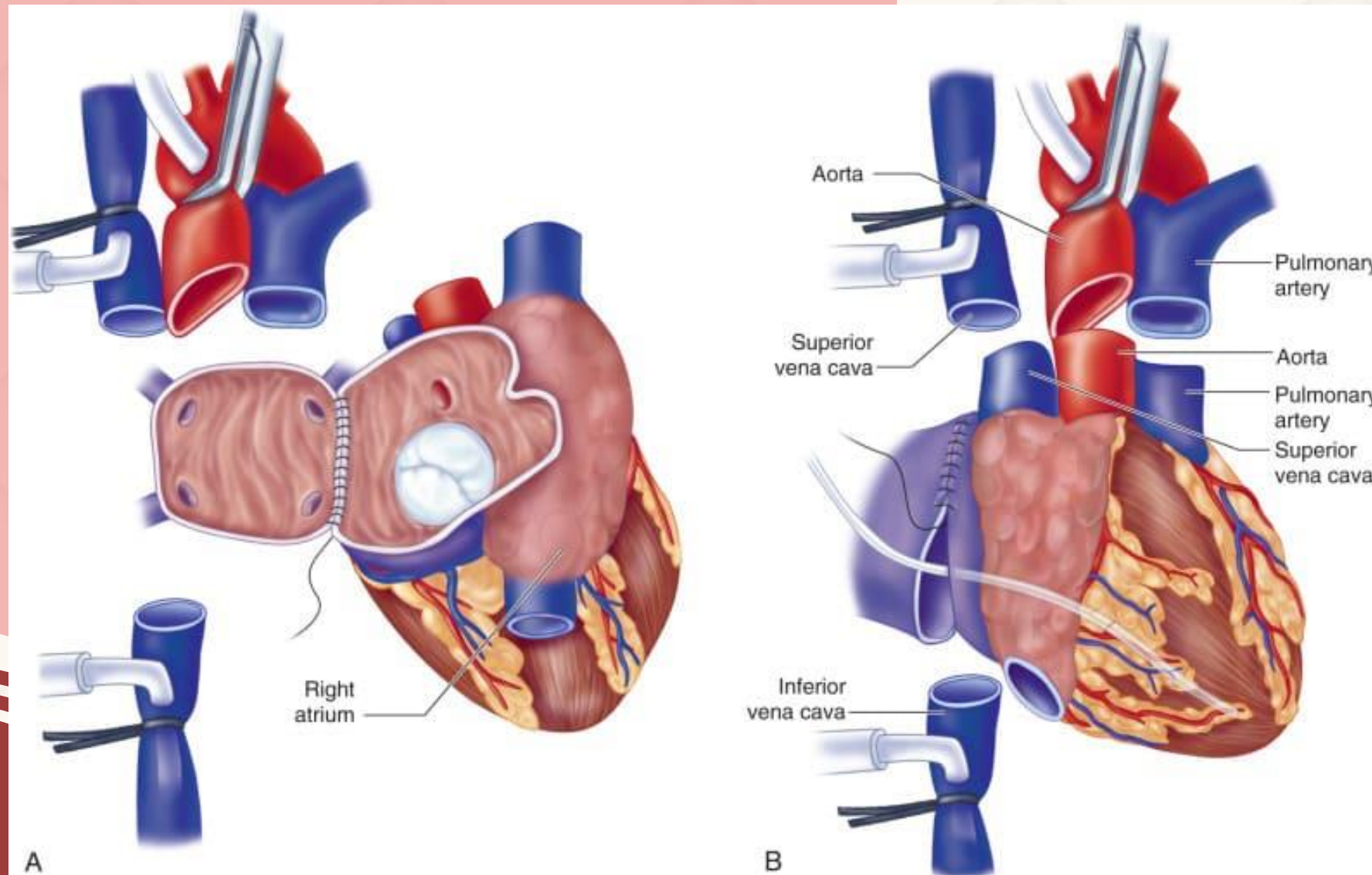
- Smaller Donor BSA

Negatively Impacts 1-yr Post Txpl Survival

- Longer ischemic time

CANNULATION OF THE **RECIPIENT**

Ascending Aortic cannulation
Bicaval Venous Cannulation



CARDIO PULMONARY BYPASS

PERFUSION TARGETS



Flow index
2.2–2.4 L/min/m²



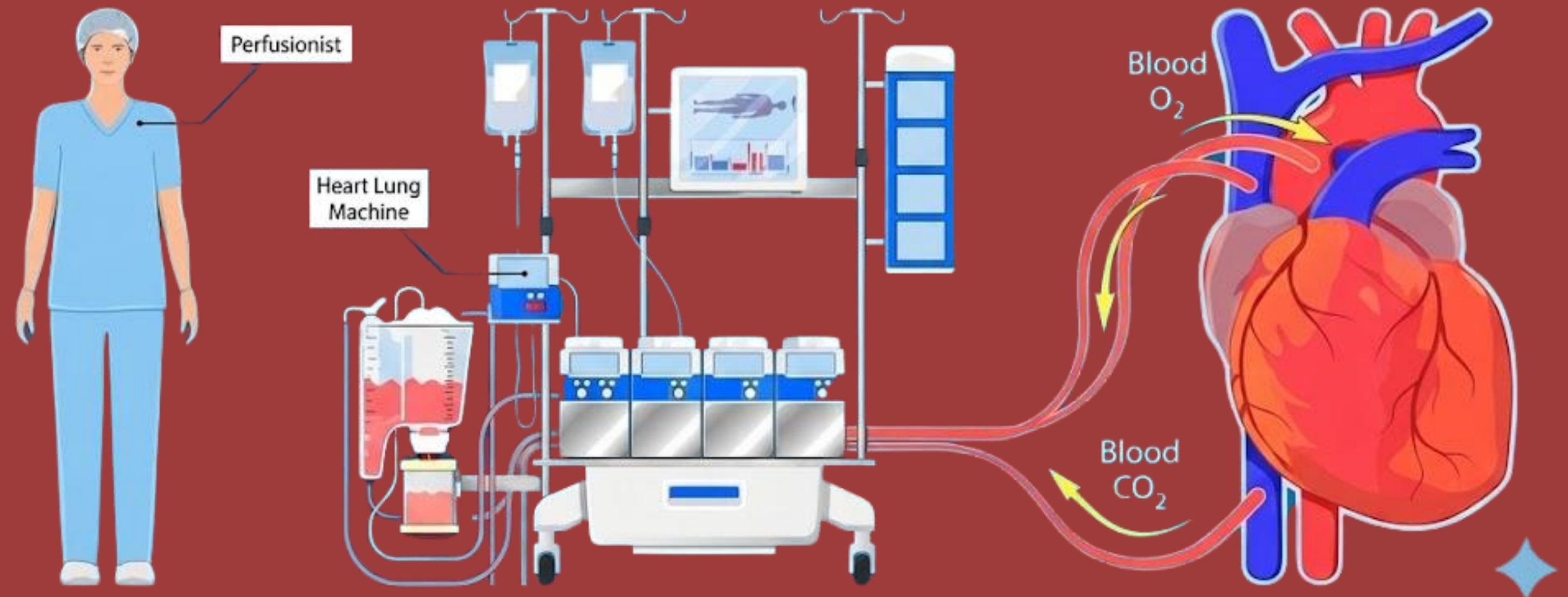
MAP (Mean Arterial Pressure)
50–70 mmHg



Temperature
Mild to Moderate Hypothermia (34 - 32°C)



Cool down further for complex congenital cases and transplant populations



CARDIAC PRESERVATION METHODS

Method	Temperature	Description	Benefits
 Traditional Cold Storage – Cooler box	 4-10°C	Ice slush in the outer cooler box and heart in the cold cardioplegic solution in a polystyrene box in the first box	The current standard worldwide. Cheap and no personal to intervene and can be send alone on a flight
 Hypothermic perfusion preservation	 4-10°C	Continuous pumping of cold crystalloid/crystalloid/cardioplegic solution	Superior energetic state preservation; better post-reperfusion contractility
 Ex-vivo perfusion systems	 Normothermic (32.8°C+) or hypothermic	Continuous evaluation of donor donor hearts	Allows marginal donor assessment; reduces complications; optimal survival up to 5 years
 Organ Care System (OCS)	 Normothermic (37°C), beating state	Portable extracorporeal system via aorta connection	Near-physiologic state; extends ischemic time to 9+ hours; FDA-approved for DCD hearts

ISCHEMIC TIME & GRAFT RISK

Duration of ischemia directly impacts transplant outcomes

<4 Hours

Excellent

Optimal window for graft viability and long-term outcomes

4-6 Hours

Acceptable

Moderate risk with careful donor-recipient matching

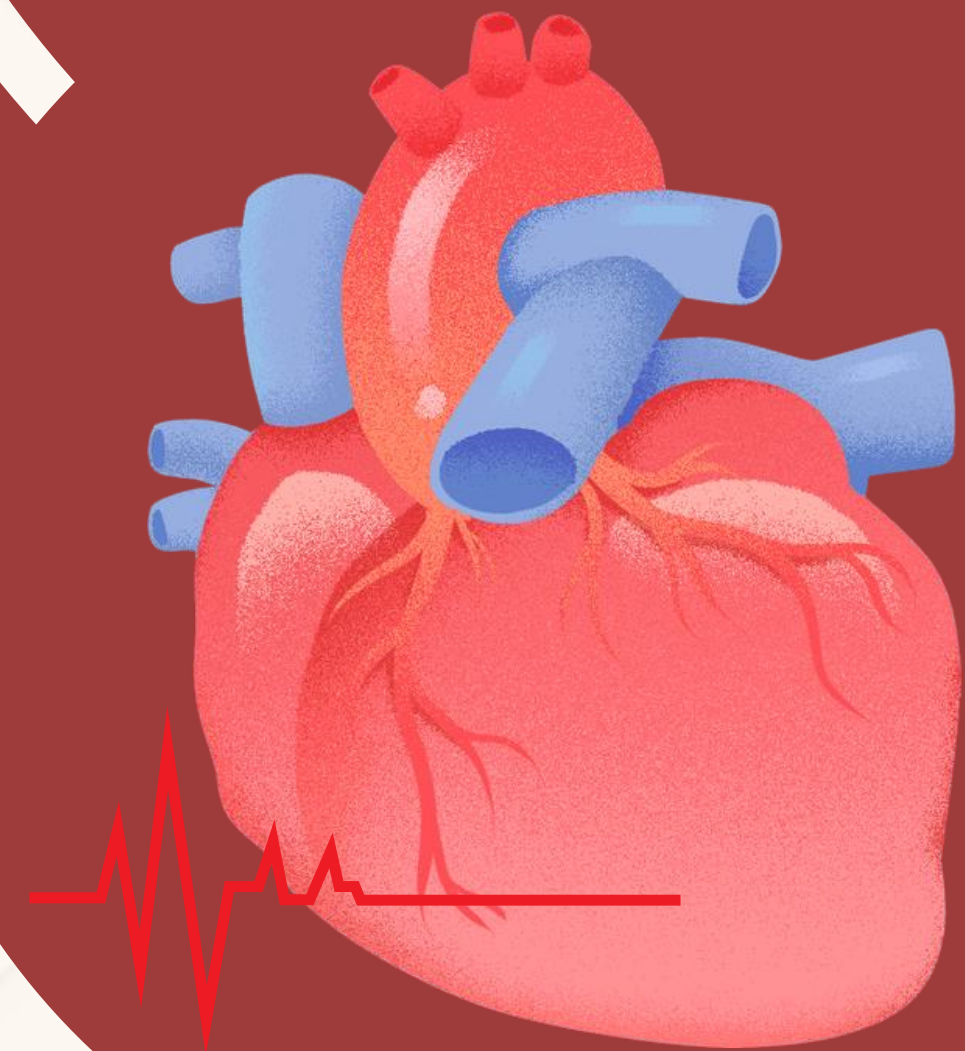
>6 Hours

High Risk

Significantly elevated risk of primary graft failure

SOUTH AFRICAN CONTRIBUTIONS

Researchers at Groote Schuur Hospital and the University of Cape Town were pioneers in prolonged donor-heart preservation. They developed portable hypothermic perfusion systems capable of preserving donor hearts for significantly longer periods than conventional cold storage. Experimental and clinical work demonstrated preservation times of 7–17 hours and laid important groundwork for modern ex-vivo preservation technologies.



CASE STUDY



OLDEST HEART TRANSPLANT RECIPIENT

Date of operation: September 1990

Diagnosis: Idiopathic cardiomyopathy

Procedure: Orthotopic heart transplantation

Recipient history

- Developed 5 years earlier.
- Gradually deteriorated and became almost completely bedridden.
- Assessed as a suitable transplant candidate.
- Pulmonary vascular resistance approximately 2 Wood units.
- Had been on the waiting list for about 3 weeks before a donor became available.

Donor

- 17-year-old male.
- Approximately 7 kg lighter than the recipient.
- Same blood group.
- Sustained a gunshot wound to the head 18–24 hours before organ retrieval.
- Haemodynamically stable.
- Donor heart harvested.
- No patent foramen ovale (PFO) present.
- Kidneys, liver and spleen were also retrieved for transplantation.

CASE STUDY



OLDEST HEART TRANSPLANT RECIPIENT

Operative findings

At sternotomy:

- Heart was extremely dilated.
- Very poor contractility.
- Very high central venous pressures.

Transplant procedure

A standard biatrial orthotopic heart transplant was performed:

1. Cardiopulmonary bypass established.
2. Recipient cooled to 25°C.
3. Recipient heart excised.
4. Donor heart implanted with:
 - Left atrial anastomosis
 - Right atrial anastomosis
 - Pulmonary artery anastomosis
 - Aortic anastomosis
5. Tisseel fibrin glue used to reinforce anastomoses.
6. Heart reperfused and returned spontaneously to sinus rhythm.

CASE STUDY



OLDEST HEART TRANSPLANT RECIPIENT

Post-bypass course

- About 10 minutes after reperfusion there was a brief episode of complete AV dissociation.
- Temporary right ventricular pacing wires were used.
- Pacing required only 5–10 minutes.
- Normal sinus rhythm returned spontaneously.
- Weaned from bypass without difficulty.
- Required only moderate inotropic support.
- Haemostasis satisfactory.
- Two drains inserted.
- Pericardium partially closed.

Outcome

- Transferred to ICU in stable condition.
- Extubated approximately 8 hours after transplantation.
- At the time the note was dictated (4 days later), the patient was reported to be doing very well.

Operative times

- Cardiopulmonary bypass time 1 hr 46 min
- Ischaemic time 1 hr 41 min
- Maximum flow rate 4.7 L/min
- Lowest nasopharyngeal temperature 24.8°C



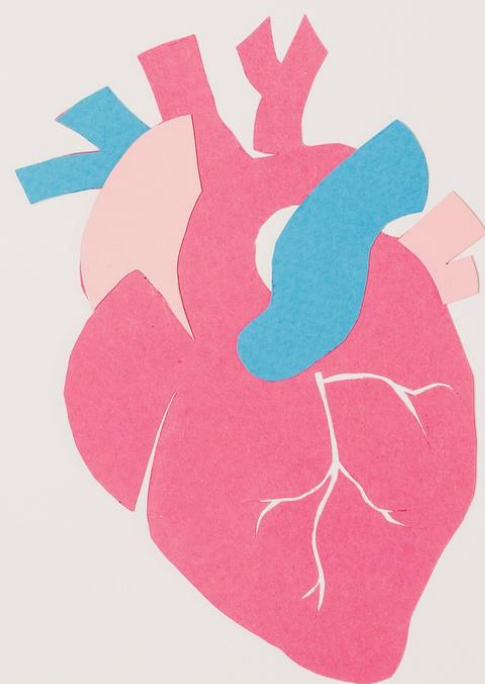
OUTCOME SUMMARY

Heart transplantation remains the definitive treatment for carefully selected patients with end-stage heart failure. South Africa continues to play a globally significant role in transplantation through the legacy of Groote Schuur Hospital and the University of Cape Town. Despite the challenges that we endure, but we are can be proud to say that our outcomes remain comparable with international standards.

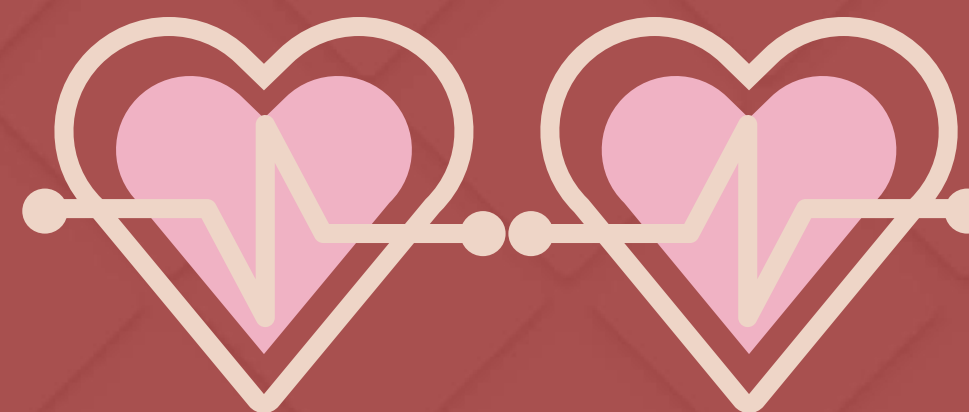
Advances in preservation technology—including hypothermic perfusion and ex-vivo organ support—offer promising opportunities to expand the donor pool and improve long-term graft function in the future.



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DO YOU HAVE ANY
QUESTIONS?



THANK
YOU

