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Faculty of Health Sciences
University of the Free State
April 2010

CARDIOTHORACIC SURGERY – COMPLEX SIMPLICITY OR SIMPLE COMPLEXITY?

Complexity Theory

- A set of concepts that attempts to explain complex phenomena not explainable by traditional (mechanistic) theories
- Integrates ideas from chaos theory, cognitive psychology, computer science, evolutionary biology, general systems theory, fuzzy logic, information theory and related fields
- Deals with natural and artificial systems as they are and not by simplifying them (constituent parts)
- Recognises that complex behaviour emerges from simple rules
- All complex systems are networks of many interdependent parts interacting according to these rules

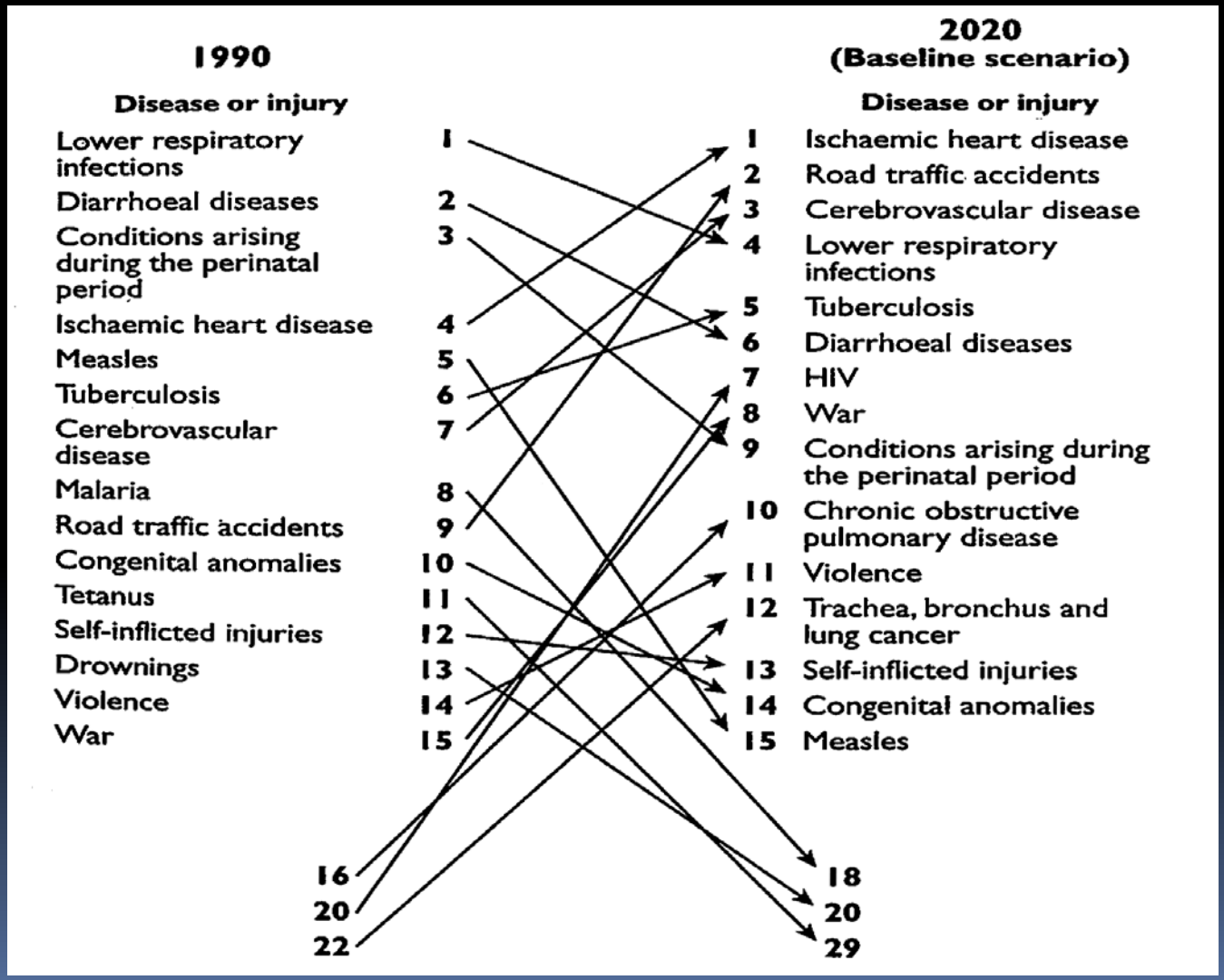
Rheumatic Heart Disease in Children

- Table 2: Estimated number of cases in 5 to 14-yr olds, reported 2003 WHO, The Atlas of Heart Disease and stroke

Sub-Saharan Africa 1 008 207	**China** 176 576	**South-Central Asia** 734 786
Asia (other) 101 822	**Latin America** 136 971	**Eastern Mediterranean & North Africa** 153 679
Eastern Europe 40 366	**Pacific** 7 744	**Industrialised Countries** 33 330

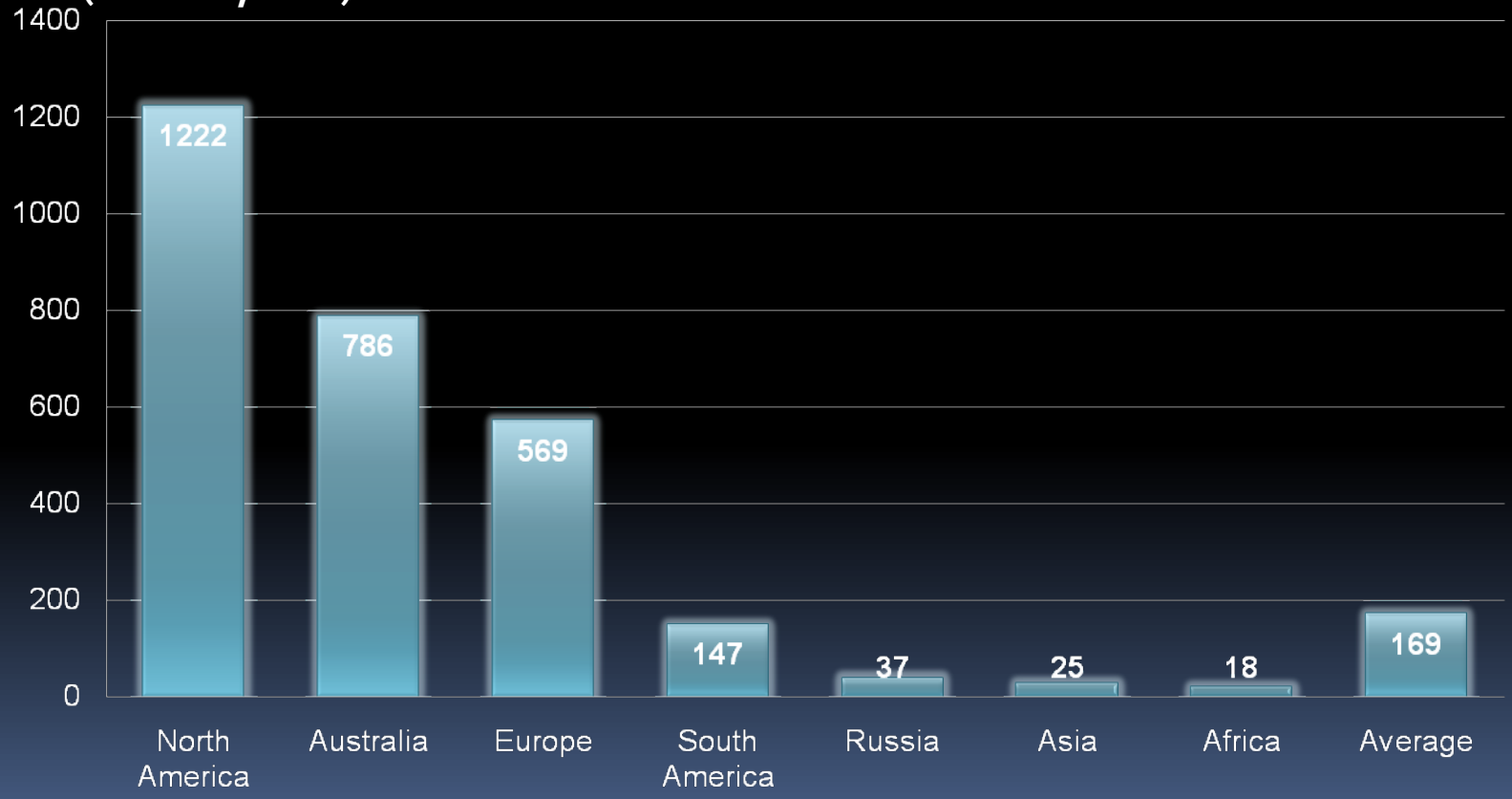
WHO PROJECTIONS

LEADING CAUSE OF DEATH - DEVELOPING WORLD



Number of Open Hearts

- Figure 1: Number of open-heart operations per million in selected regions (Pezzella, 2002)



Cardiac Surgery in SA in 2003

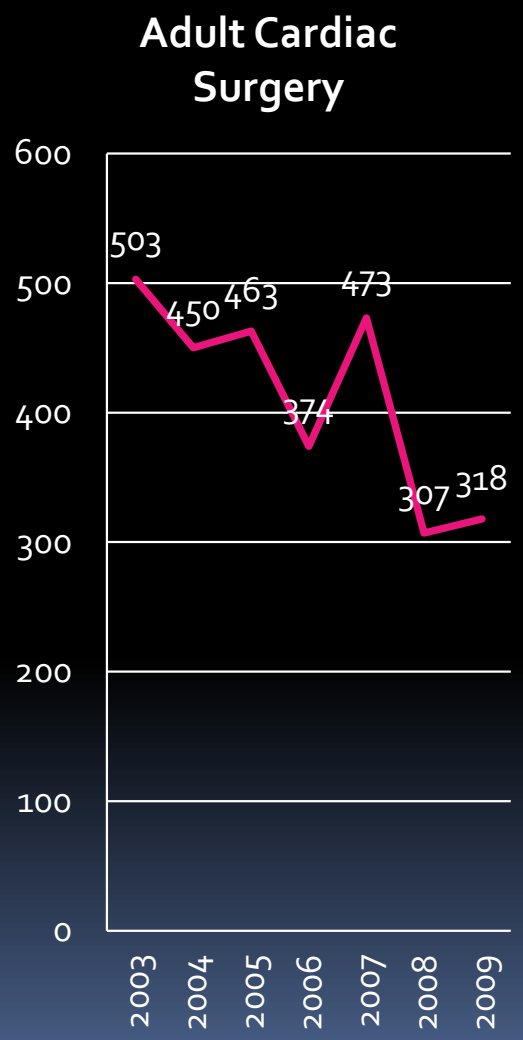
- **Sustainability**

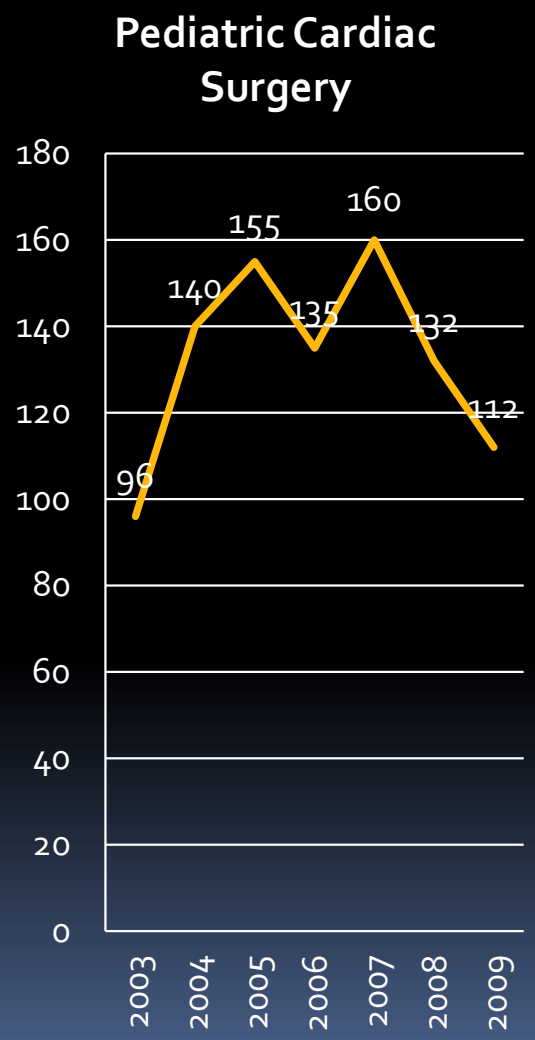
Inefficiency
Lack of alternatives, strategic planning, leadership

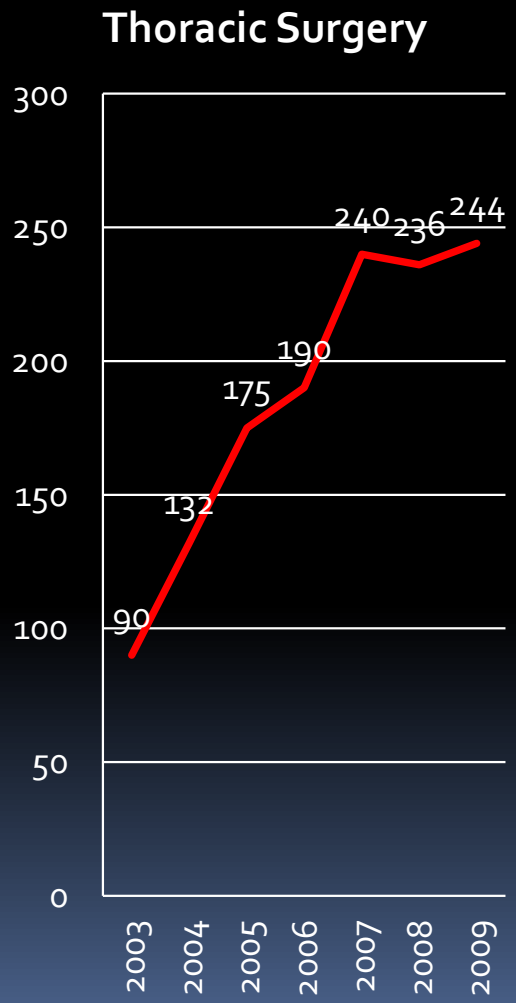
- **Academic Excellence:**

Training and standards
Surgical exposure
Leadership?

Service delivery



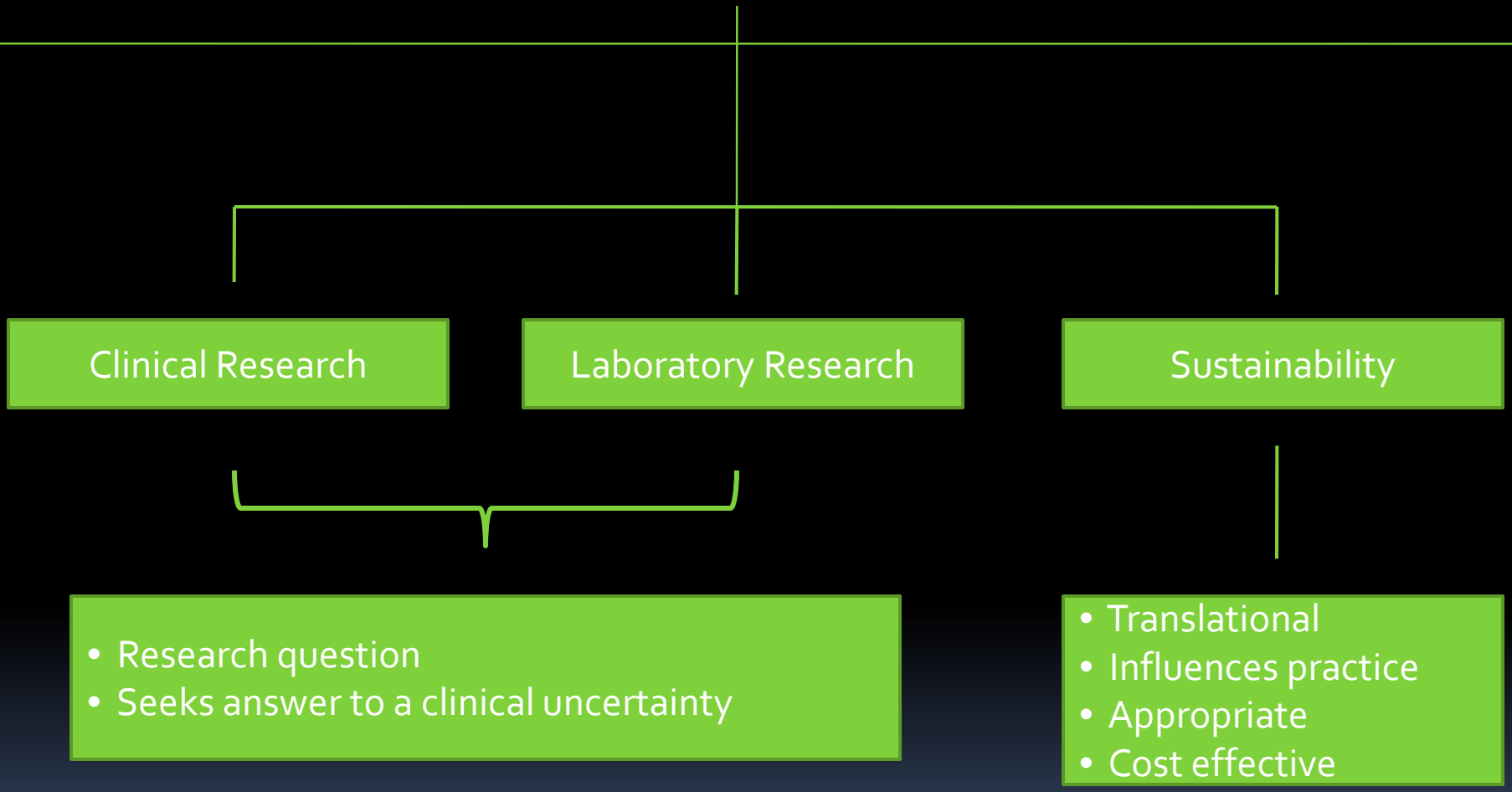




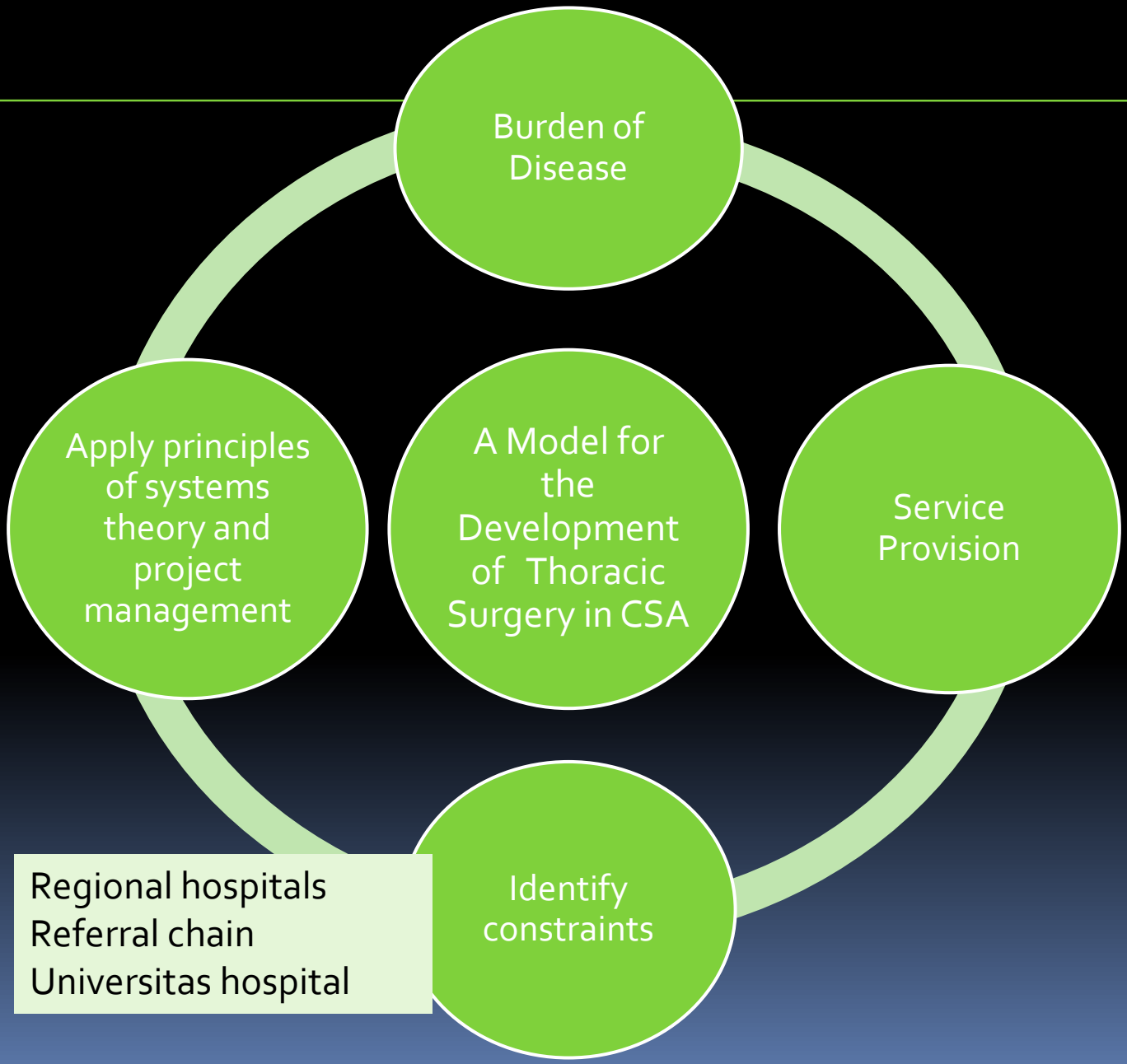
You've got to be very careful if you don't know where you're going because you might get there...

-- Yogi Berra

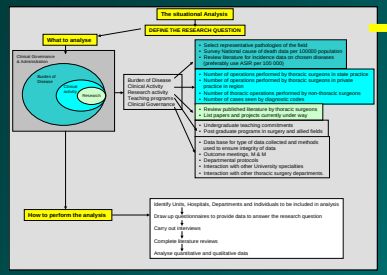
Research Domains



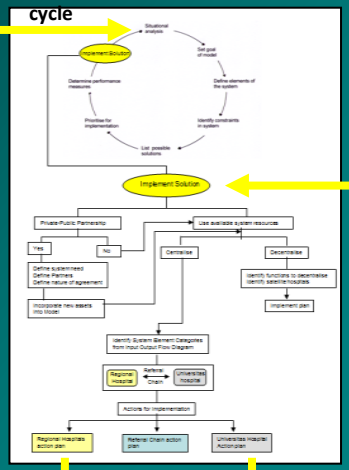
The ATLAS model – Linegar PhD



Step 1. The Situational Analysis

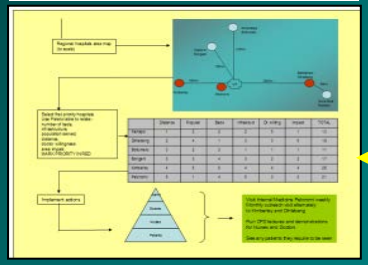


Step 2. Operational planning cycle

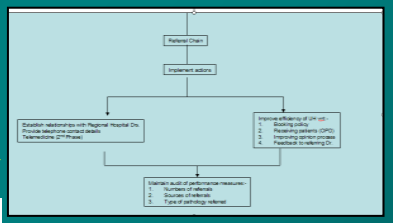


Step 3. Implement solution

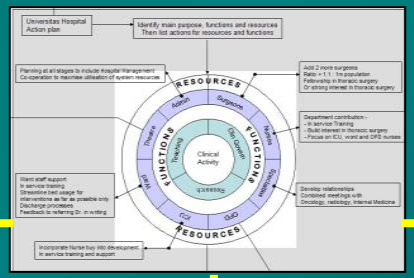
Step 4. Regional Hosp actions



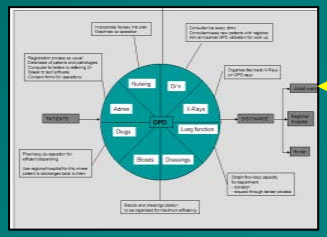
Step 5. Referral chain actions



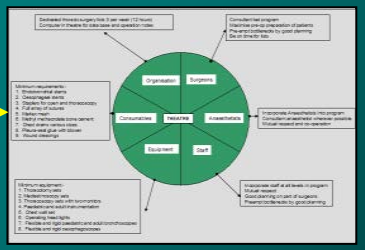
Step 6. Actions UH Resource Elements



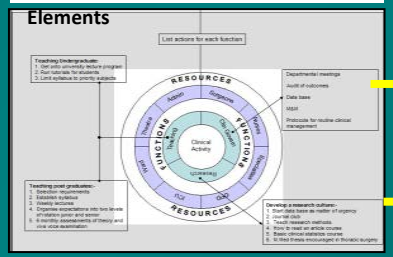
Step 6.1 UH OPD actions



Step 6.2 UH Theatre actions

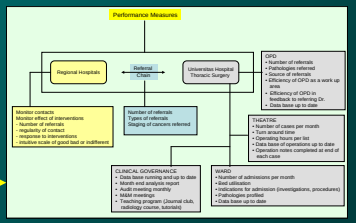


Step 7. Actions UH Functional Elements



Step 8. Database

Step 9. Performance Measures



Sustainability and Risk Management

- National Adult Cardiac Database

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Ms H Strauss

2008-03-14

PROF FE SMIT
DEPT OF CARDIOTHORACIC SURGERY
FACULTY OF HEALTH SCIENCES
UFS

Dear Prof Smit

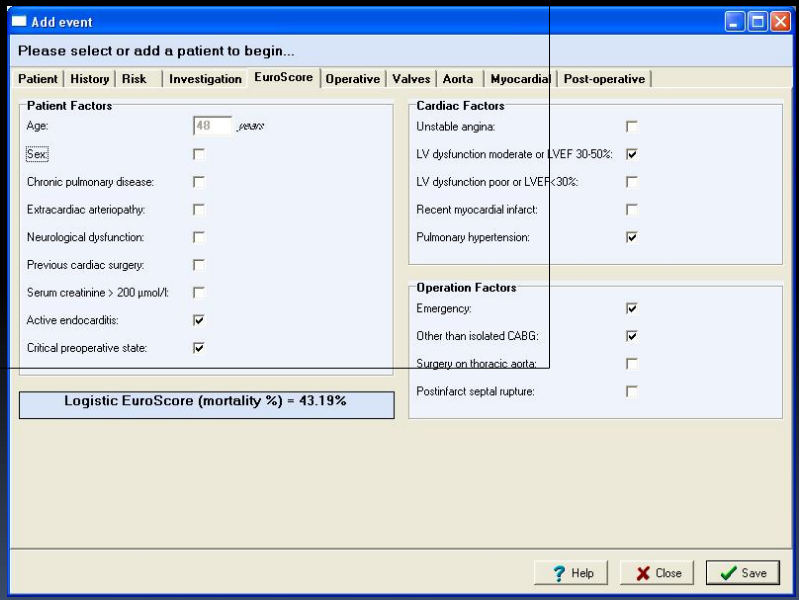
ETOVS NR 46/08
PROF FE SMIT **DEPT OF CARDIOTHORACIC SURGERY**
PROJECT TITLE: THE SOUTH AFRICAN HEART ASSOCIATION DATABASE. (CARDIAC SURGERY NATIONAL DATABASE AND CATHLAB REGISTRY).

- You are hereby informed that The Ethics Committee approved the above-mentioned at the meeting on 11 March 2008.
- Committee guidance documents: Declaration of Helsinki, ICH, GCP and MRC Guidelines on Bio Medical Research. Clinical Trial Guidelines 2000 Department of Health RSA; Ethics in Health Research: Principles Structure and Processes Department of Health RSA 2004; the Constitution of the Ethics Committee of the Faculty of Health Sciences and the Guidelines of the SA Medicines Control Council as well as Laws and Regulations with regard to the Control of Medicines.
- Any amendment, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.
- The Committee must be informed of any serious adverse event and/or termination of the study.
- A progress report should be submitted within one year of approval of long term studies and a final report at completion of both short term and long term studies.
- Kindly refer to the ETOVS reference number in correspondence to the Ethics Committee secretariat.

Yours faithfully

for **PROF BB HOEK**
CHAIR: ETHICS COMMITTEE

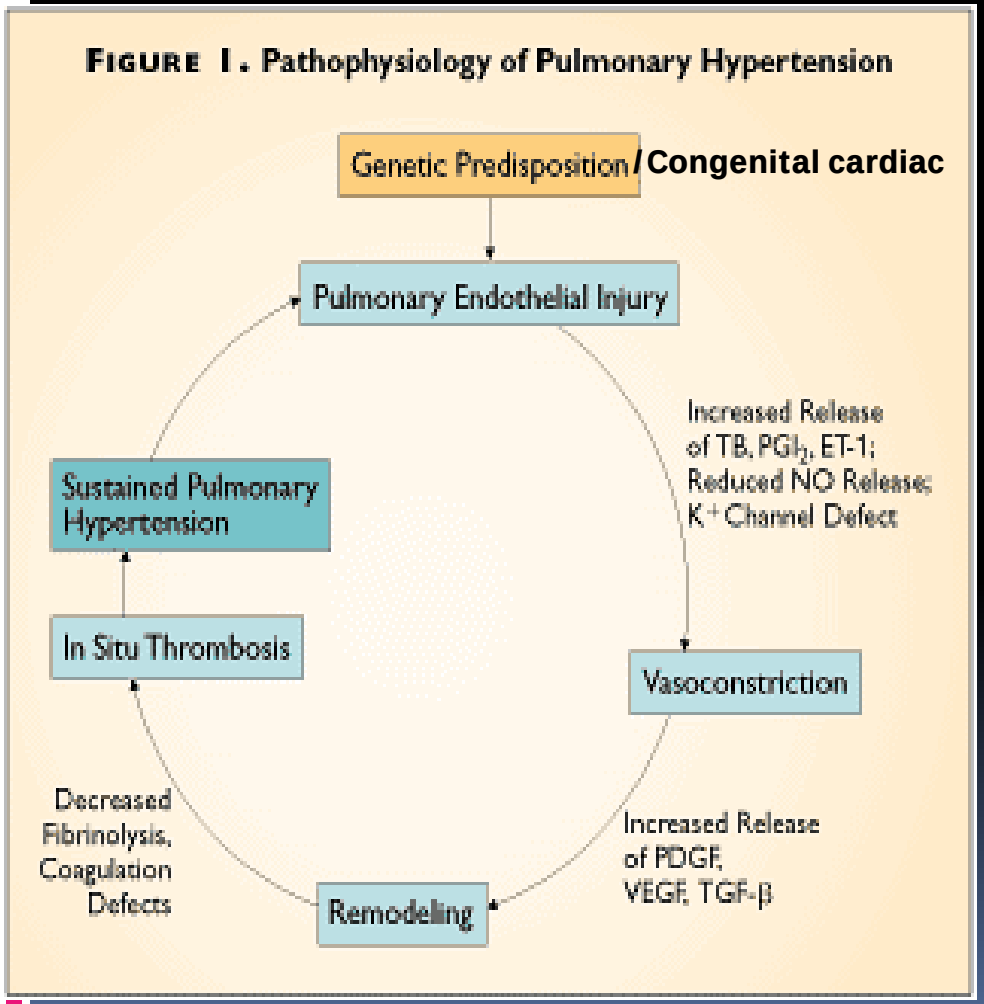
339, Bloemfontein 9300,RSA ☎ (051) 405 2812 gndkhs.md@ufs.ac.za
Republiek van Suid-Afrika / Republic of South Africa

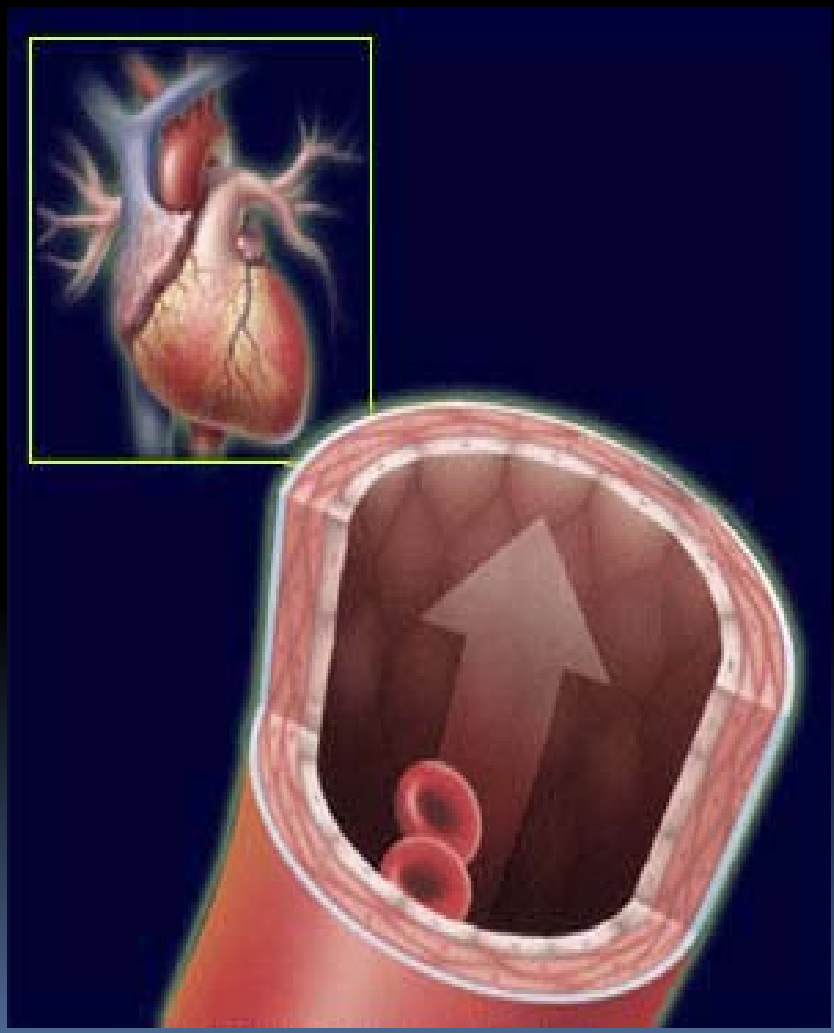


Pulmonary Hypertension

- Late presentation of congenital cardiac disease is endemic in the developing world
- In our patient population (UFS) of VSD and AVSD, pulmonary hypertension is present in 43,4% (Woods Units > 3.5)
- 16,2% has severe pulmonary hypertension (Woods Units > 6) at presentation
- Predicting reversibility of advanced PHT is a challenge

Stages/grades in Pulmonary hypertension:

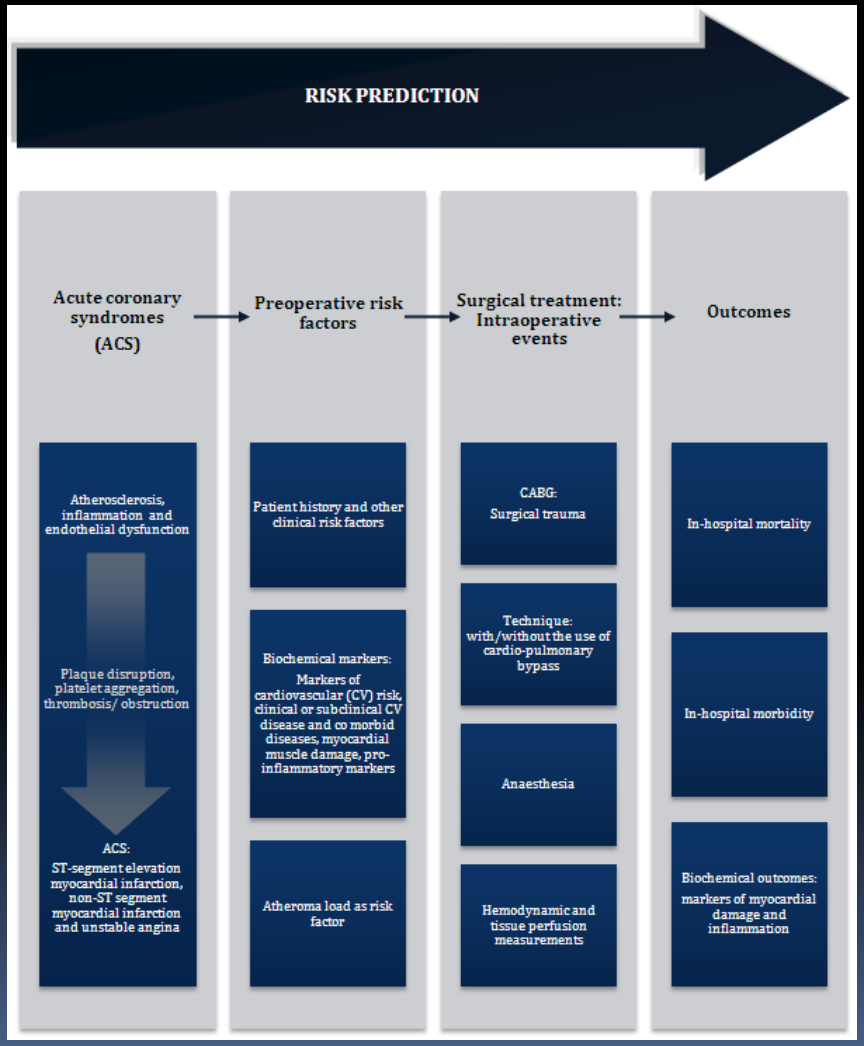


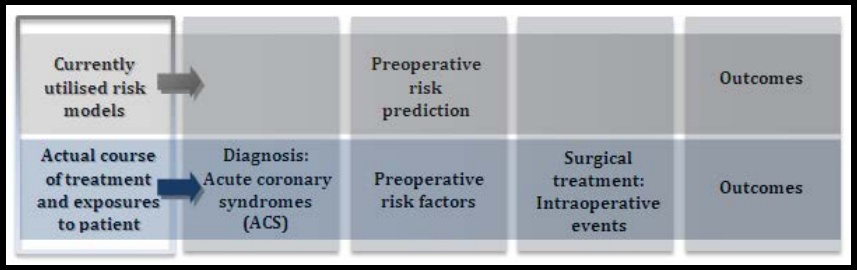


Coronary Artery Disease

- Acute Coronary Syndrome
- On-pump versus off- pump Surgery
- Longitudinal observational analytical cohort study

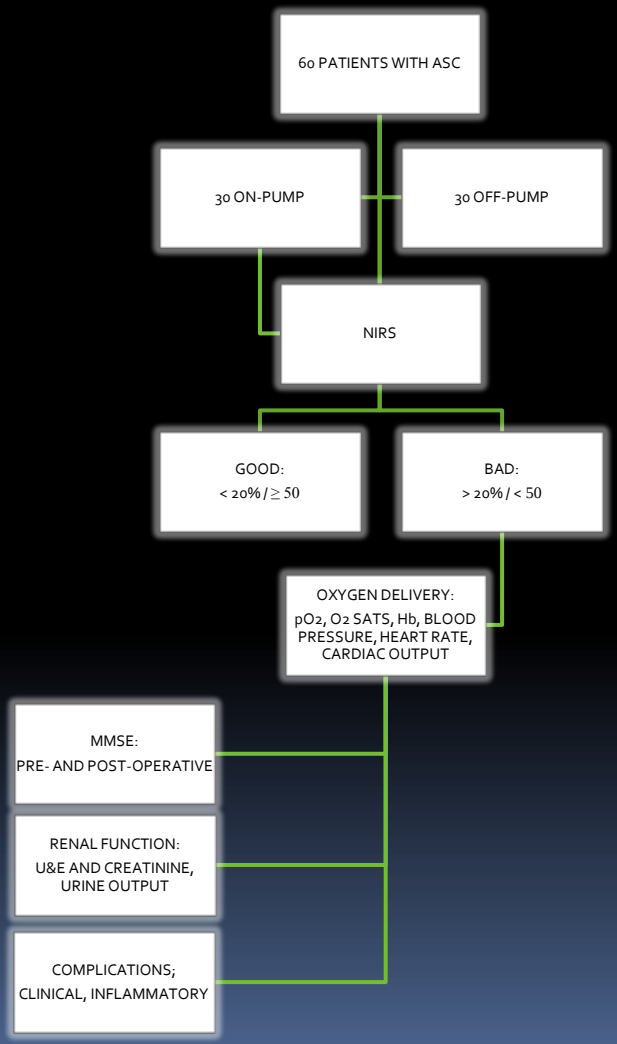
Procedural Risk

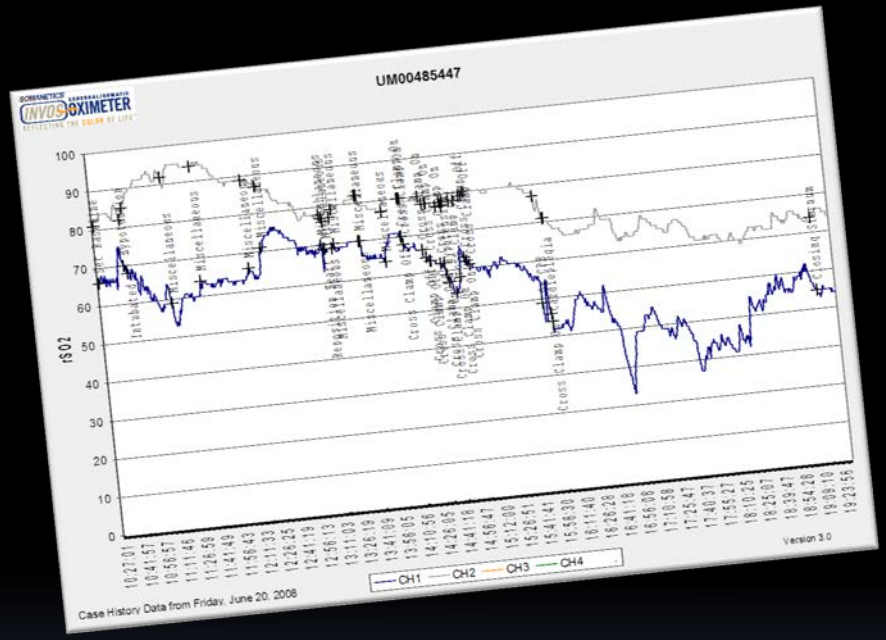




Risk factor analysis in predicting surgical outcomes in acute coronary syndromes: A proposal for an integrative risk model

Near Infrared Spectroscopy (NIRS)- Microcirculation

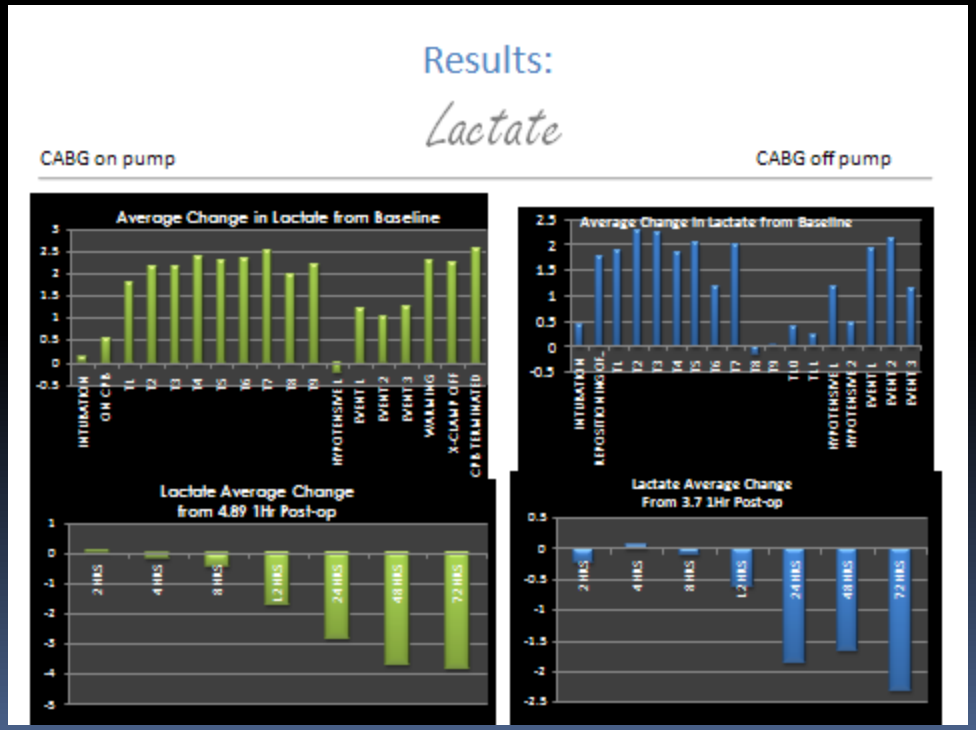




Evaluation of near-infrared spectroscopy in patients with acute coronary syndrome undergoing on and off pump coronary artery bypass graft surgery

Micro-circulation – Cellular

Evaluating the relationship of lactate and glucose levels and operative SIRS in CABG patients



SIRS in CABG patients - Inflammatory Markers

The Median (Inter-quartile) changes

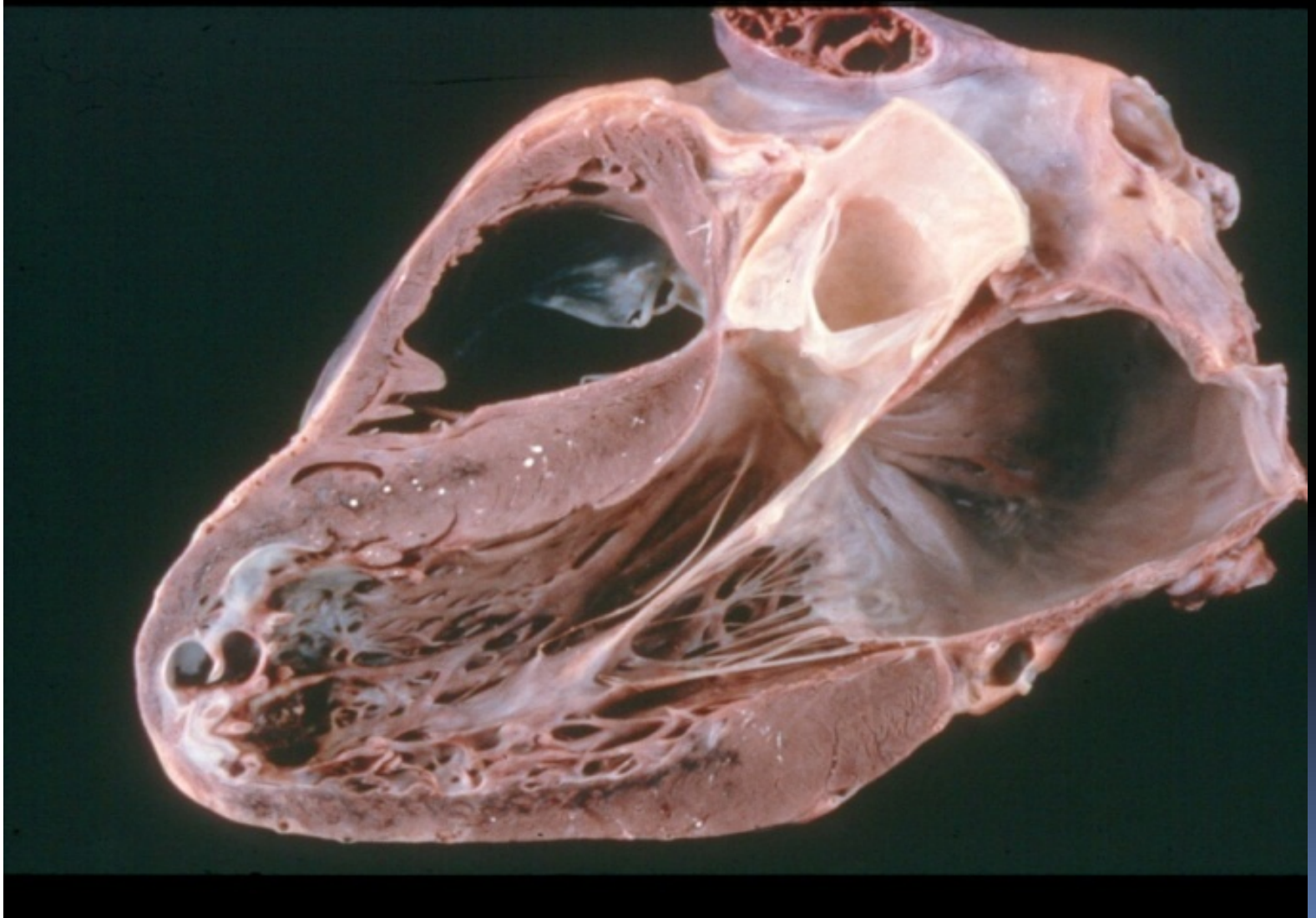
	Pre-operative Baseline		Post-operative 24 hours		Post-operative 48 hours		Post-operative 72 hours		Post-operative 96 hours		Post-operative 120 hours	
	On-pump CPB	OPCAB	On-pump CPB	OPCAB	On-pump CPB	OPCAB	On-pump CPB	OPCAB	On-pump CPB	OPCAB	On-pump CPB	OPCAB
Total = n	30	30	30	30	30	30	30	30	27	26	14	16
CRP (mg/l) Median	15.5	13.9	103.35	101.85	117	111.65	69.8	83.45	47.9	70.8 *	46.4	57.10 *
25th & 75th Percentile	6.3 - 35.7	2.9 - 39.0	85.0 - 116.3	66.4 - 137.7	89.0 - 150.4	79.7 - 130.3	45.5 - 127.9	49.3 - 106.7	33.9 - 74.4	44.2 - 90.6	29.4 - 79.7	39.5 - 95.4
PCT (µg/l) Median	0.07	0.08	1.82 ***	0.47	1.23 ***	0.41	0.79 ***	0.24	0.49 *	0.35	0.27	0.18
25th & 75th Percentile	0.06 - 0.11	0.05 - 0.10	1.10 - 4.75	0.19 - 2.21	0.69 - 3.11	0.16 - 1.48	0.44 - 1.76	0.14 - 0.83	0.31 - 1.01	0.14 - 0.85	0.19 - 0.87	0.10 - 0.45
IL-6 (ng/l) Median	0	0	76.29	96.18 *	38.66	70.92 **	12.08	32.7 **	6.4	37.9 ***	11.37	31.31 *
25th & 75th Percentile	0.0 - 5.3	0.0 - 33.4	39.9 - 128.8	42.5 - 135.6	14.8 - 86.3	36.3 - 128.0	0.9 - 48.0	17.0 - 50.9	0.0 - 34.9	12.9 - 69.9	0.0 - 47.8	15.2 - 76.8
TNF α (ng/l) Median	7.62	13.00 *	6.03	9.07	10.27	12.78	11.72	13.15	12.46	14.91	13.7	13.4
25th & 75th Percentile	6.5 - 12.5	7.8 - 16.7	4.6 - 15.4	6.1 - 14.5	6.7 - 15.1	9.0 - 15.8	7.4 - 22.5	10.8 - 21.1	7.3 - 22.3	9.8 - 20.7	10.8 - 21.9	9.9 - 18.8
WCC (10^9/l) Median	8.9	9.05	19.20 * **	15.67	19.44 * ***	13.92	15.30 * ***	11.37	11.95	11.03	11.74	9.88
25th & 75th Percentile	7.8 - 10.8	7.0 - 10.6	15.5 - 25.6	12.4 - 16.2	15.0 - 24.1	11.9 - 16.8	12.8 - 19.4	8.7 - 13.0	10.8 - 13.8	9.5 - 12.7	9.9 - 13.0	9.2 - 13.0
Neutrophils (10^9/l) Median	5.22	5.1	15.35 * *	11.39	14.57 * **	10.96	10.57 * ***	7.54	8.53	7.12	7.92 *	6.43
25th & 75th Percentile	4.1 - 6.9	4.1 - 6.4	10.9 - 19.7	9.7 - 13.7	11.8 - 19.3	9.0 - 13.7	9.6 - 14.6	5.8 - 9.7	7.0 - 10.1	5.7 - 8.2	6.2 - 9.1	5.6 - 7.8
Lymphocytes (10^9/l) Median	2.76 *	2.36	1.30 **	0.96	1.91	1.58	2.28	1.97	2.44 **	2.26	2.3	2.02
25th & 75th Percentile	2.22 - 3.08	1.86 - 3.15	1.07 - 1.87	0.75 - 1.54	1.37 - 2.58	1.17 - 2.22	1.75 - 2.88	1.47 - 2.35	2.00 - 3.19	1.64 - 2.82	1.73 - 3.64	1.71 - 2.96
Lymphocytes (10^9/l) Median	0.64	0.54	1.47 *	0.98	0.98	0.97	0.89	0.77	0.76	0.74	0.89	0.91
25th & 75th Percentile	0.57 - 0.91	0.46 - 0.86	0.81 - 2.06	0.79 - 1.35	0.68 - 1.27	0.82 - 1.20	0.69 - 1.29	0.70 - 1.12	0.63 - 0.97	0.65 - 0.95	0.71 - 1.13	0.75 - 1.18
Neutrophil/ Lymphocyte ratio (10^9/l) Median	2.05	1.9	10.87	10.09	7.6	6.68	5.19 **	3.93	3.27	3.61	2.83	3.27

*p<0.1; **p<0.05; ***p<0.01; and ****p<0.001

Inflammatory Marker Comparison Between Patients with Acute Coronary Syndrome undergoing On-Pump versus Off-Pump Coronary Artery Bypass Graft Surgery

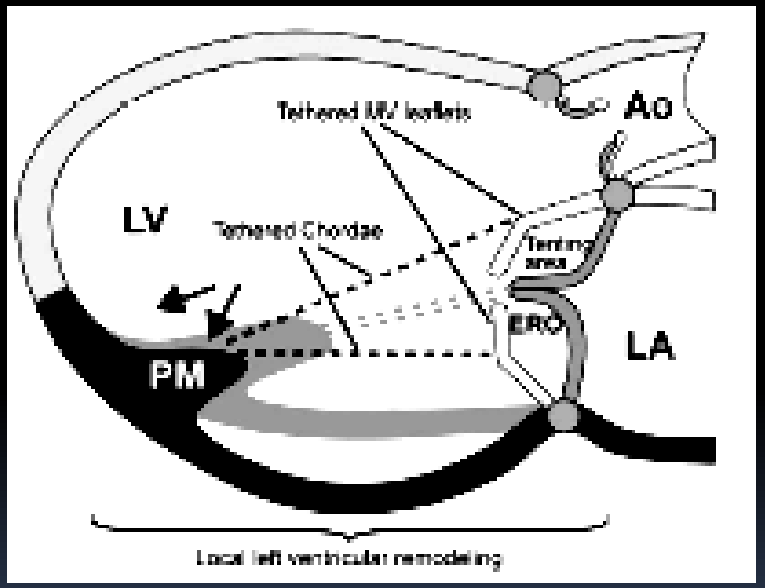
END STAGE HEART DISEASE

Posterior LV Infarction- tethering of leaflets

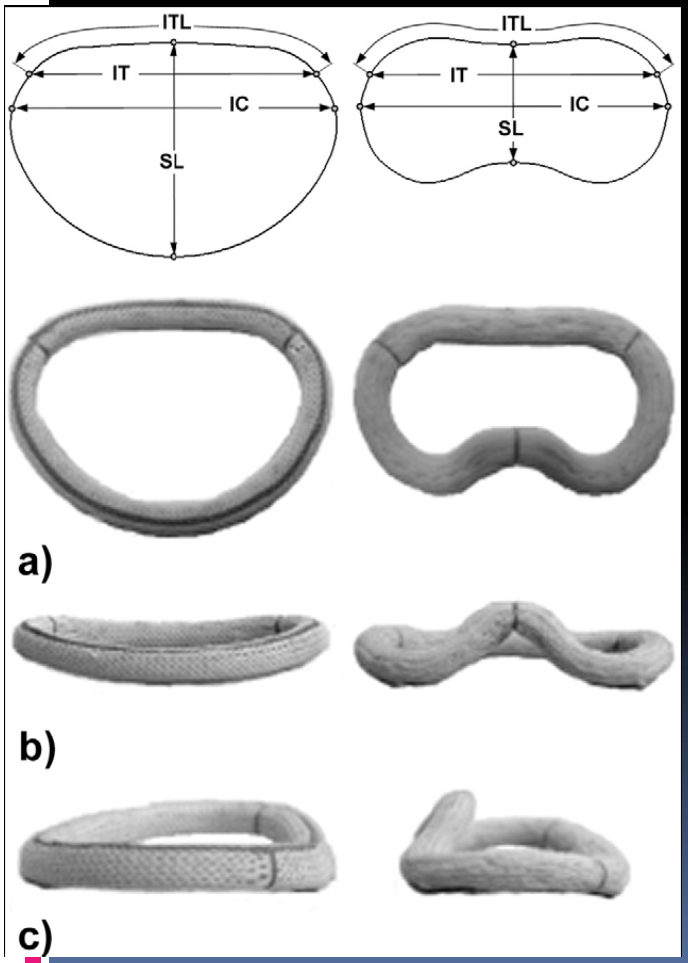


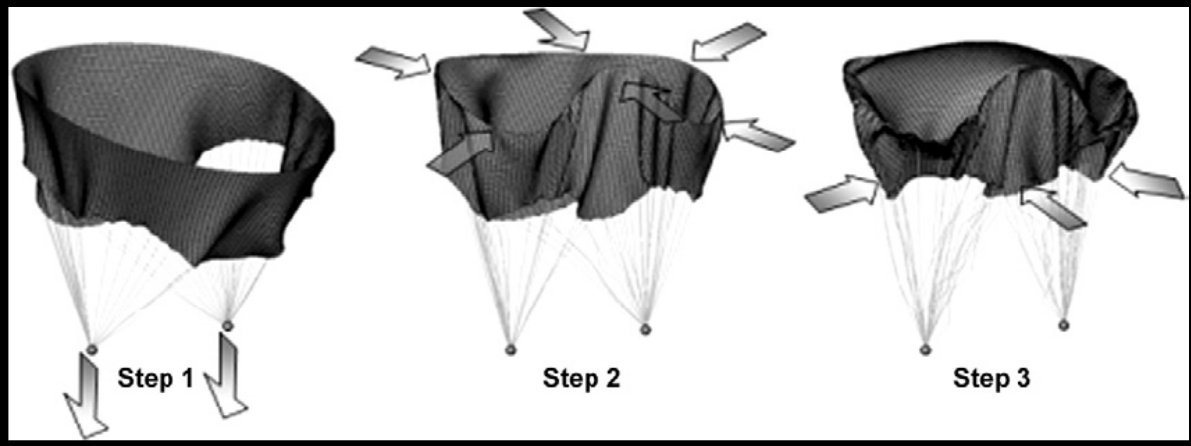
Functional MR Pathophysiology

- Normal MV function requires coordinated dynamics of all components
- LA
- Annulus
- Leaflets
- Chordae
- Papillary muscle
- Ventricle



A Finite Element Study (Bolling 2007)





White,HD Circulation 1987

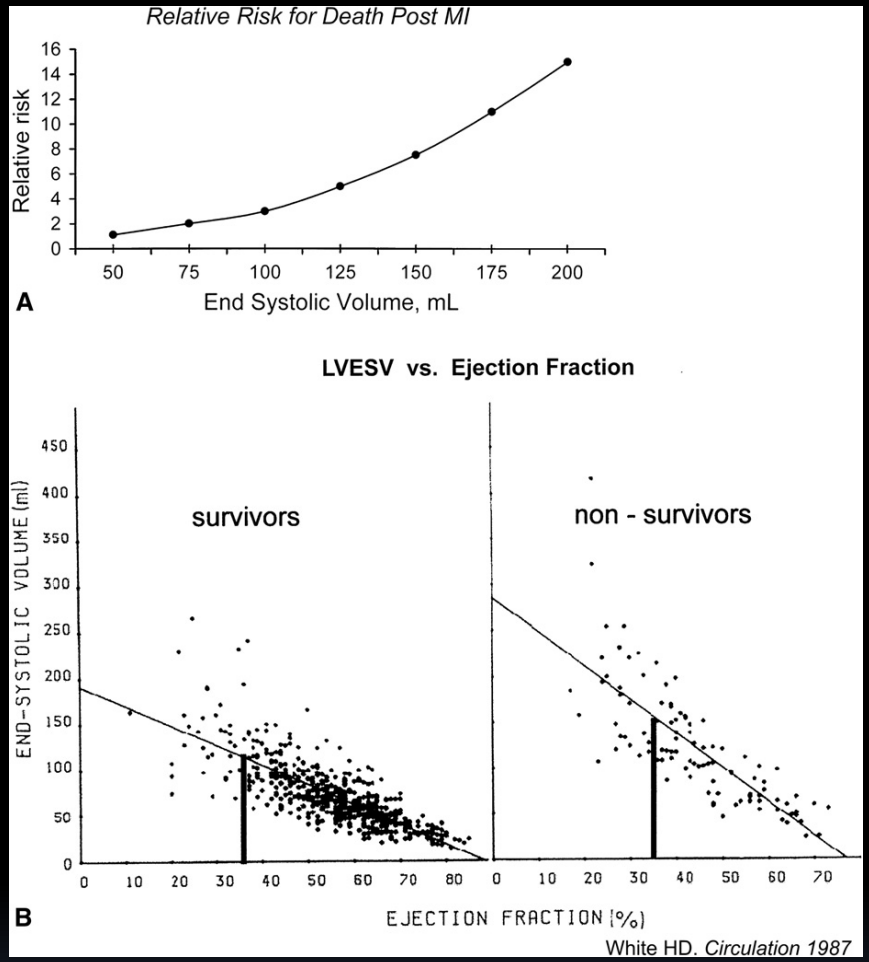


Figure 2: *A. Relationship between LV end-systolic volume and mortality. Note (1) that volume is in milliliters, not milliliters per square meter, so that the LV end-systolic volume index would be twice this number if patient size were 2 m^2 and (2) that volume increase is a surrogate for increased mortality. B. Comparison of prognosis in survivors and non-survivors in relationship to ejection fraction (solid line is at 35%) and LV end-systolic volume in milliliters. Note that lower LV end systolic volume at 35% ejection fraction is associated with reduced mortality in survivors compared with increased mortality in non-survivors when LV end-systolic volume is higher at 35% ejection fraction. MI, Myocardial infarction; LVESV, left ventricular end-systolic volume.*

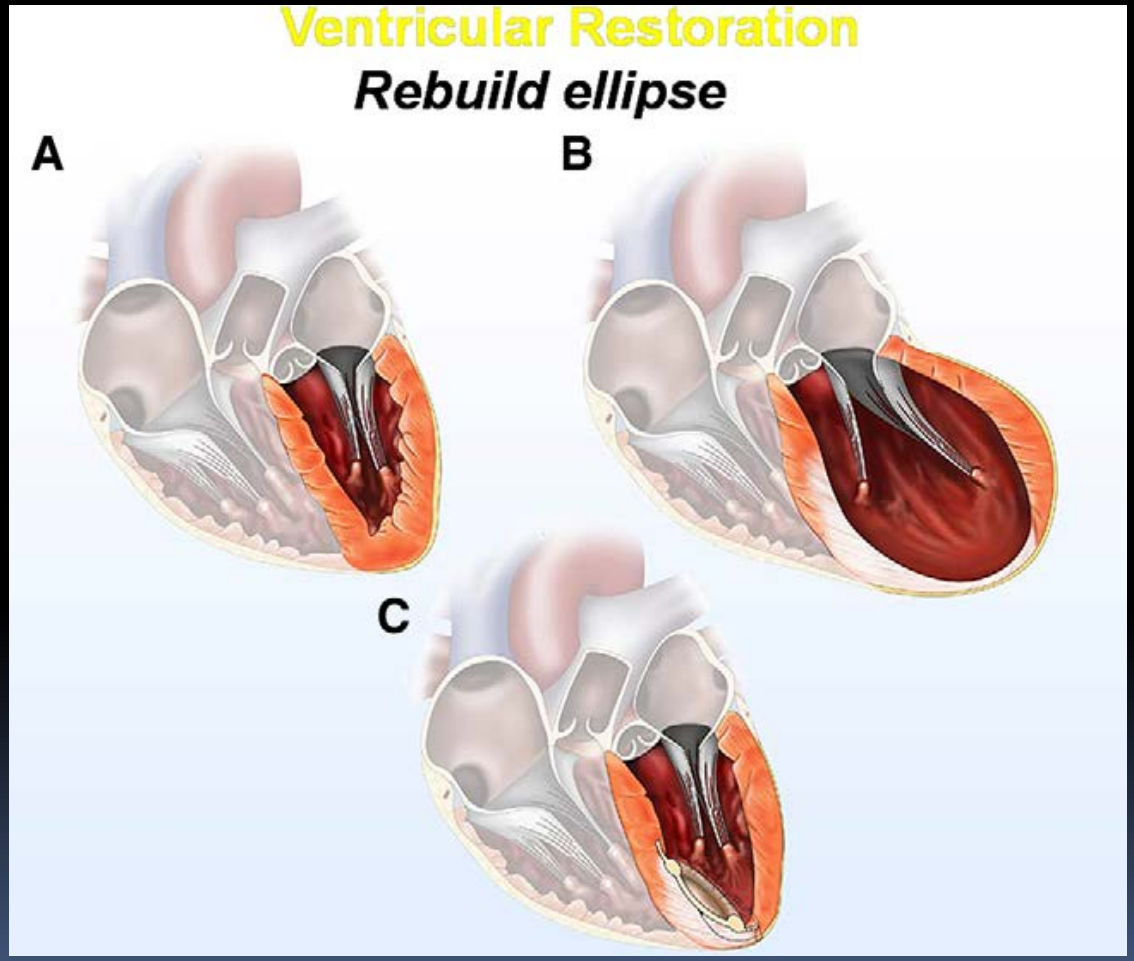


Figure 4: *Changes in LV size and shape after SVR. The elliptical normal form (A) becomes spherical after anterior septal infarction (B). Size and shape are returned toward a more normal elliptical configuration by placing a patch to exclude the scar and returning nonscarred remote muscle back to its conical form (C). Adapted from: Buckberg G. Ventricular Structure and surgical history. Adapted from: Heart Failure Rev. 2005; 9: 255-68.*

The Heart Valve Dilemma

- The ideal prostheses does not exist yet
- Research and development aimed at first world countries with aging populations and sophisticated follow-up
- Complicated and extremely expensive developing and licensing process
- Lack of new concepts (mechanical valves -1977)
- Exciting (but slow progress) with tissue engineering
- Majority of potential valve recipients live in the developing world
- They are young
- Their countries are developing and becoming more affluent

Prosthetic heart valves: Catering for the few

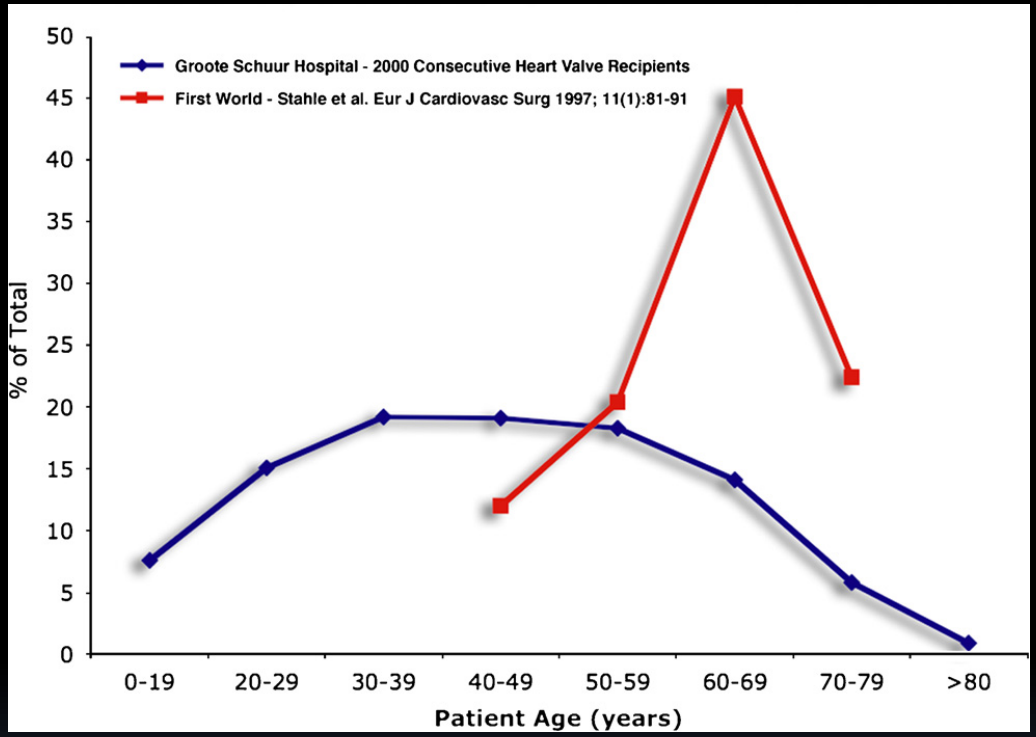


Fig. 1. Typical age-distribution of patients undergoing heart valve replacement in the First World and in a Developing Country. While prosthetic valve recipients in a First World population are predominantly in the age group of 60–69 years (red line) they are broadly disseminated over an age spectrum from 20 to 70 years in a Developing Country such as South Africa (blue line). As the age distribution of 2000 consecutive heart valve recipients at the Groote Schuur Hospital (University of Cape Town) shows, a significant proportion of patients is even younger than 20 years.

Zilla P, Brink J, Human P, Bezuidenhout D. 2008. Prosthetic heart valves: Catering for the few. Biomaterials 29: 385–406.

When Reconstruction Fails or is Not Feasible: Valve Replacement Options in the Pediatric Population

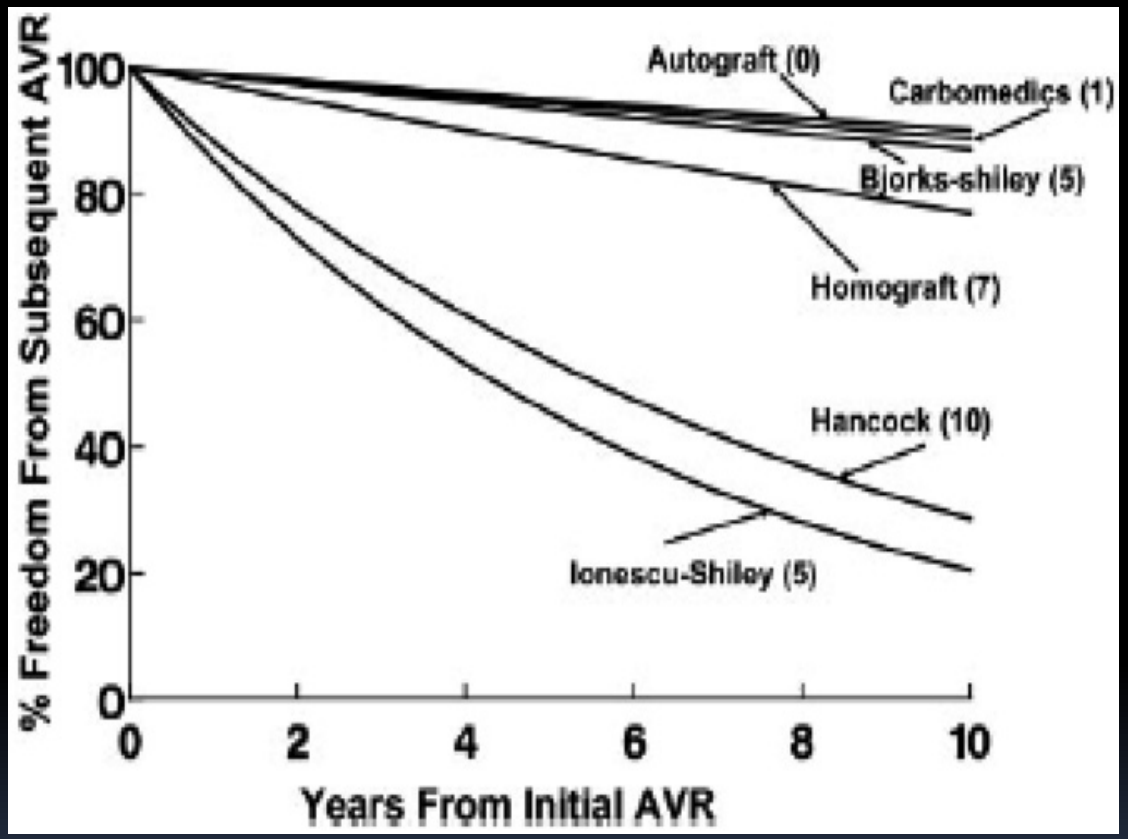
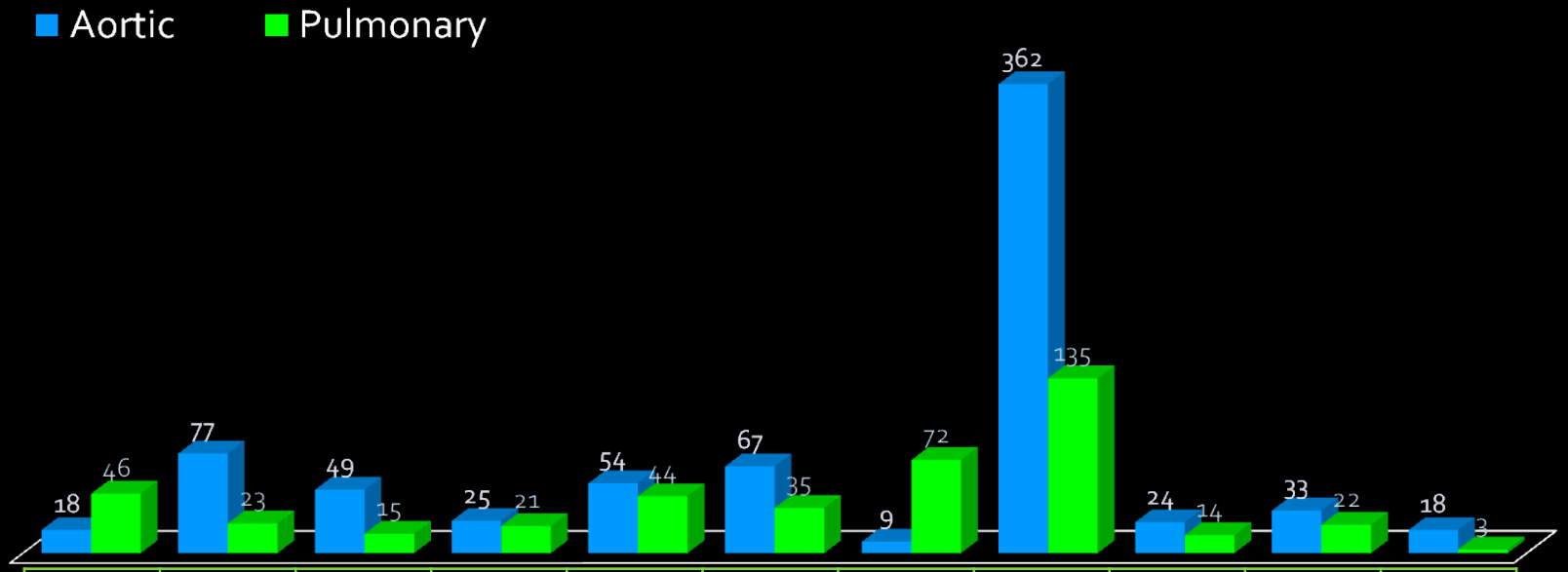


Figure 7 Freedom from reoperation after initial AVR stratified by prosthetic type. A multivariable equation was constructed for remaining alive after initial AVR without subsequent valve replacement according to the original competing risk model and forcing all valve types into the equation. The resulting model was then solved for a hypothetical 10-year-old patient of 40 kg undergoing operation in 1990. The autograft has superior longevity, whereas the tissue valves and the allografts have considerably worse durability. The numbers in parentheses represent the total number of AVR episodes for each prosthesis type.

Husain HS, Brown JW. 2007. When Reconstruction Fails or is Not Feasible: Valve Replacement Options in the Pediatric Population. Semin Thorac Cardiovasc Surg Pediatr Card Surg Ann 10:117-124.

Harvested Homografts

Role of Homograft Bank



Durban	JHB General	JHB Private	PTA General	PTA Private	CT Academic	CT Private	Universitas	Medi-Clinic	Germany	PE
64	100	64	46	98	102	81	497	38	55	21

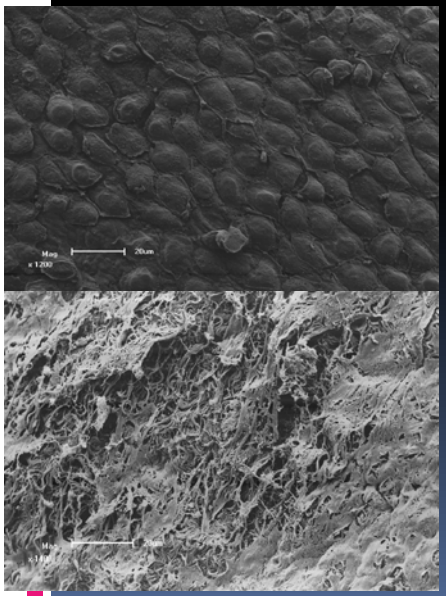
Current Research

1. Sheep Model

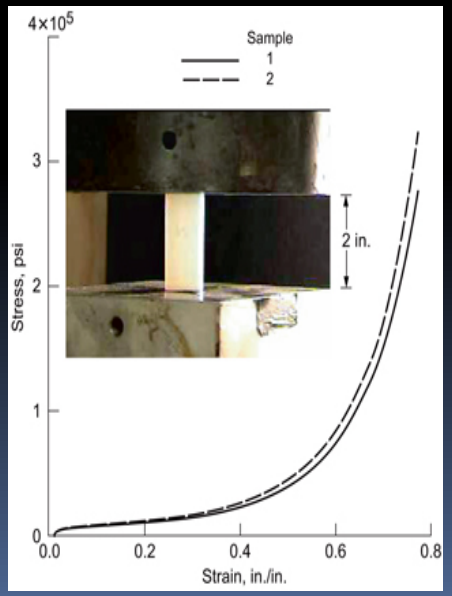
2. Homograft

3. Implantation

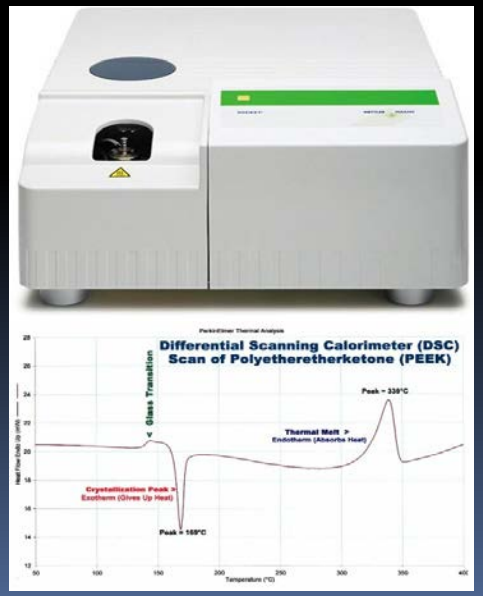
4. Post-operative Care



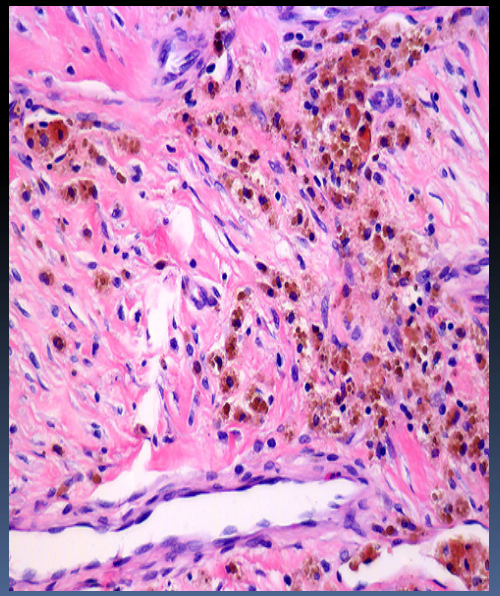
SEM



Tensile Strength

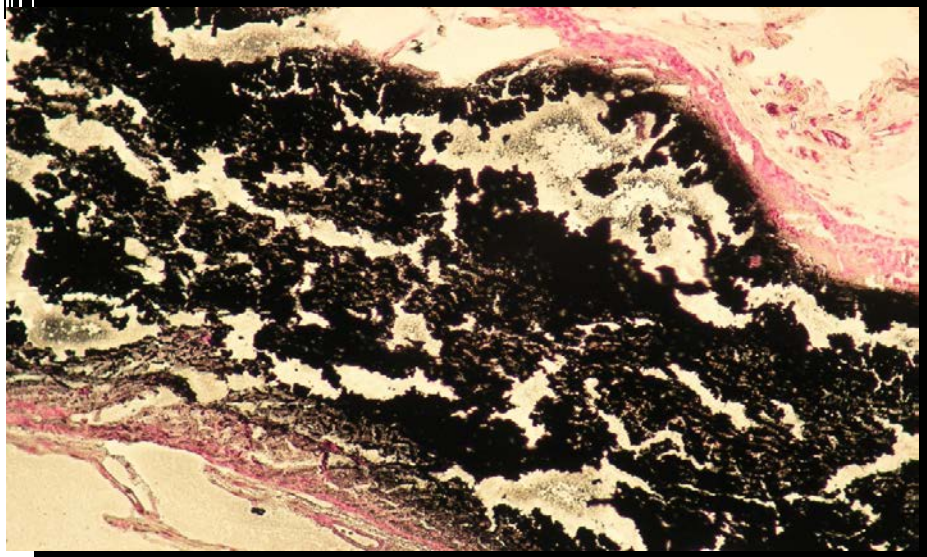


DSC

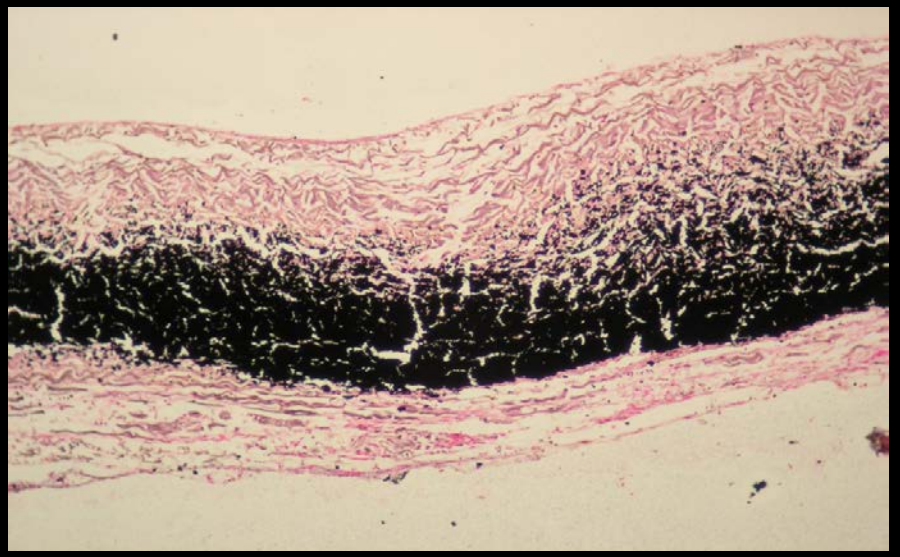


H & E

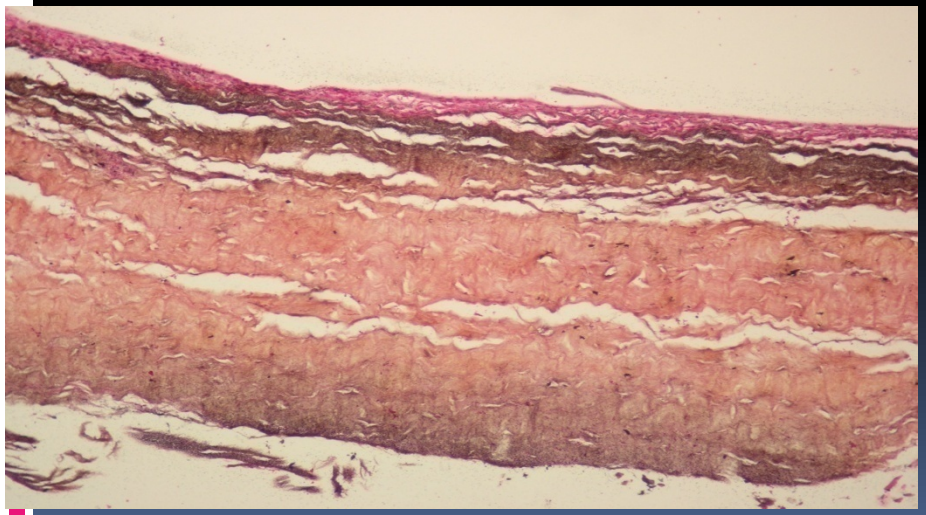
Degree of calcification (von Kossa)



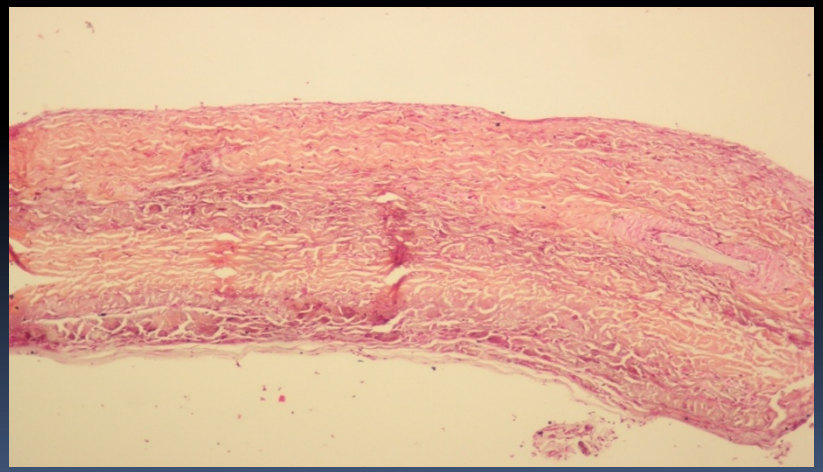
Glutaraldehyde



Aluminium

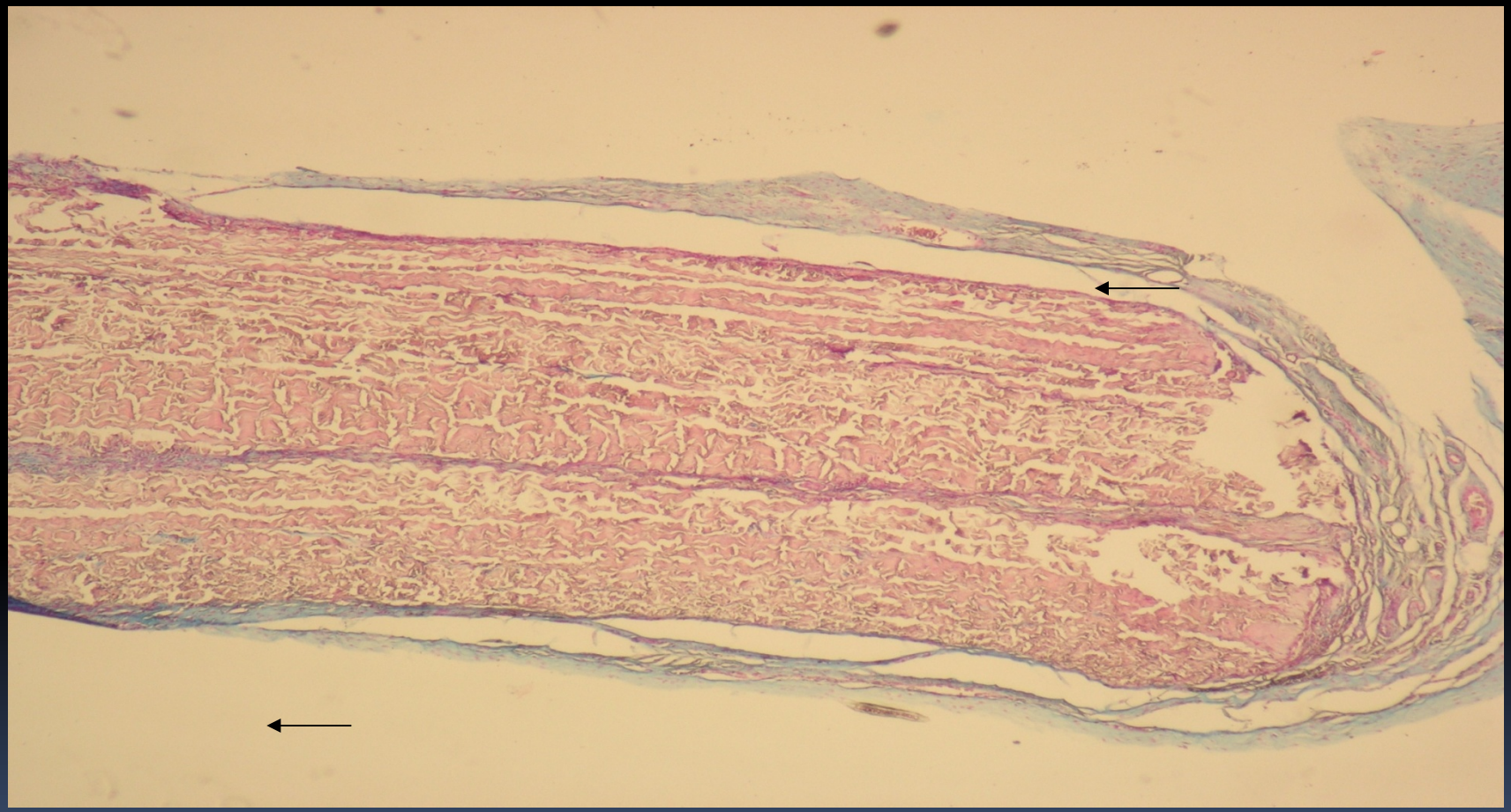


Glycosaminoglycans



Glycar

Superficial binding of GAGs to the outer surface of pericardium



Prosthetic heart valves: Catering for the few

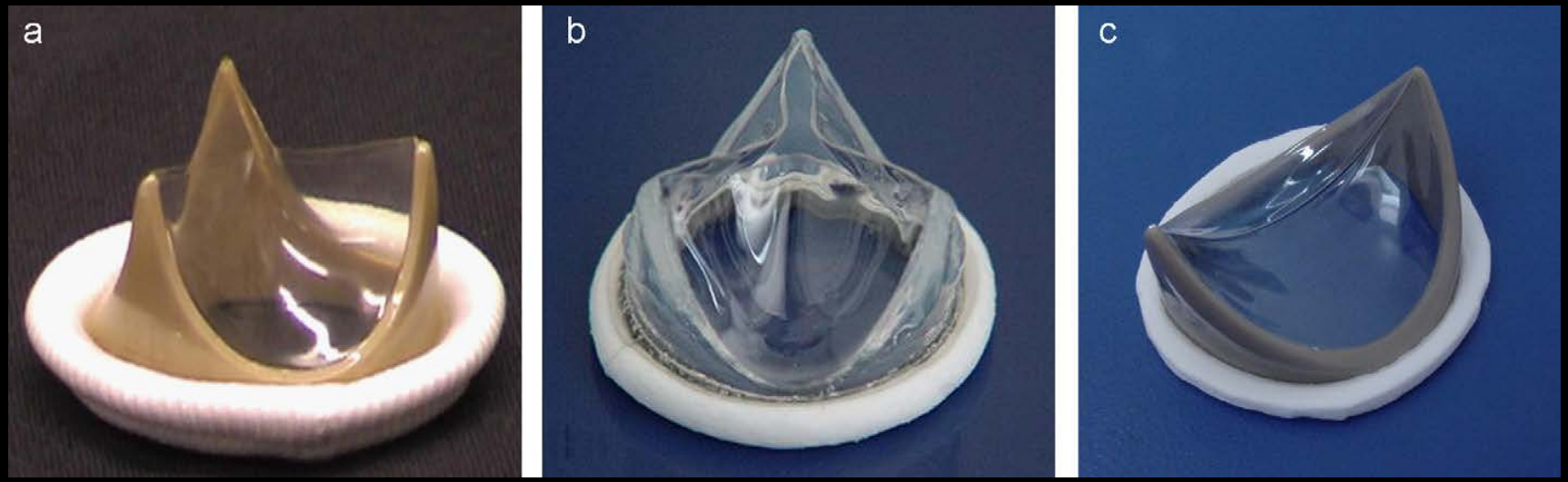


Fig. 8. Polymeric heart valves: (a) a frame machined from polyetheretherketone (PEEK) and coated with a thin layer of leaflet polyurethane. Leaflets of acommercially available polyetherurethane suitable for animal implantation (Estane 58315, BF Goodrich, Westerlo-Oevel, Belgium) were dip-coated ontothe frame. This valve design has achieved durabilities in excess of 400 million cycles (10.5 years) during in vitro fatigue testing [162]; (b) and (c):polycarbonate urethane (PCU) tri-leaflet and bi-leaflet valves intended for the aortic and mitral positions. These particular designs achieved in vitrodurabilities of up to 600 million (15.8 years) and 1 billion (26 years) cycles, respectively.

Zilla P, Brink J, Human P, Bezuidenhout D. 2008. Prosthetic heart valves: Catering for the few. Biomaterials 29: 385–406.

Polyurethane: material for the next generation of heart valve prostheses?

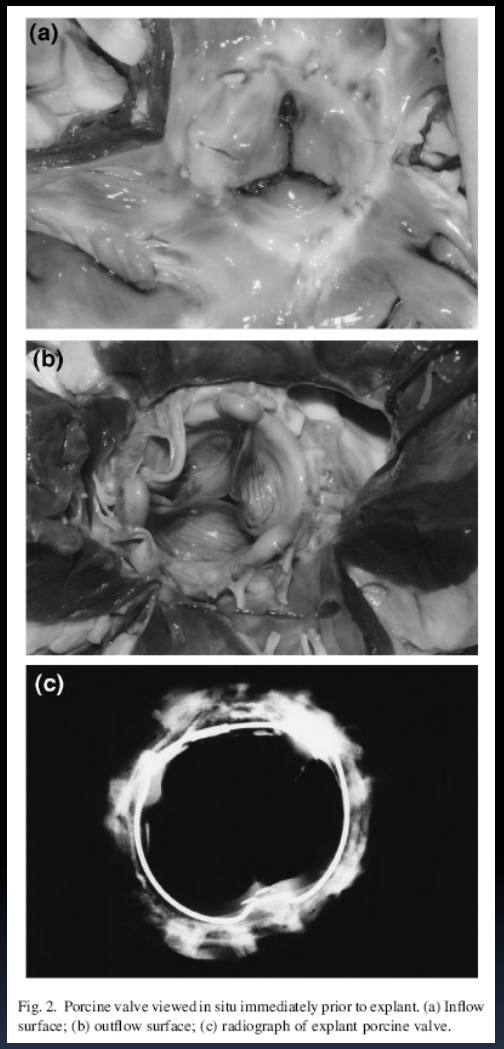


Fig. 2. Porcine valve viewed in situ immediately prior to explant. (a) Inflow surface; (b) outflow surface; (c) radiograph of explant porcine valve.

Fig. 2. Porcine valve viewed in situ immediately prior to explant. (a) Infow surface; (b) outfow surface; (c) radiograph of explant porcine valve.

Wheatley DJ, Raco L, Bernacca GM, Sim I, Belcher PR, Boyd JS. 2000. Polyurethane: material for the next generation of heart valve prostheses? European Journal of Cardio-thoracic Surgery 17: 440-448.

Polyurethane: material for the next generation of heart valve prostheses?

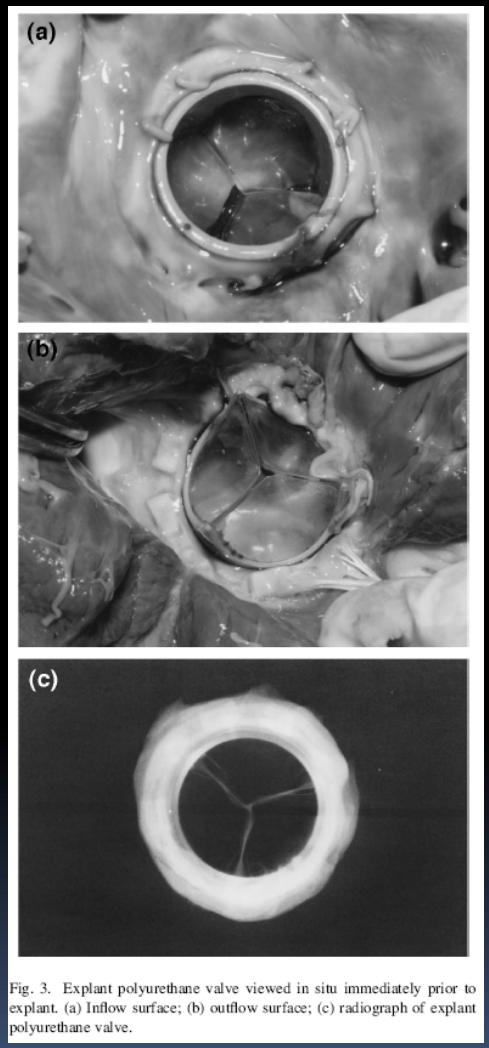


Fig. 3. Explant polyurethane valve viewed in situ immediately prior to explant. (a) Infow surface; (b) outfow surface; (c) radiograph of explant polyurethane valve.

Fig. 3. Explant polyurethane valve viewed in situ immediately prior to explant. (a) Inflow surface; (b) outflow surface; (c) radiograph of explant polyurethane valve.

Wheatley DJ, Raco L, Bernacca GM, Sim I, Belcher PR, Boyd JS. 2000. Polyurethane: material for the next generation of heart valve prostheses? European Journal of Cardio-thoracic Surgery 17: 440-448.

Impact of Design Parameters on Bileaflet Mechanical Heart Valve Flow Dynamics

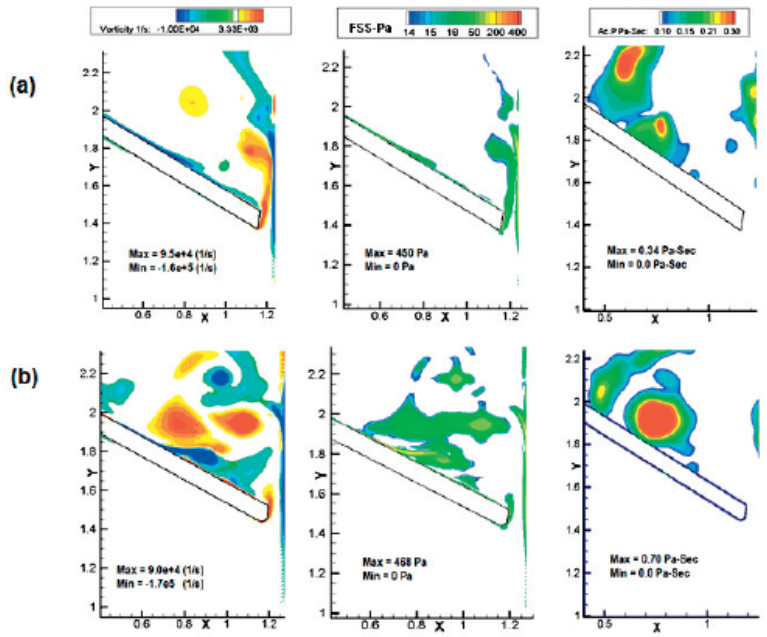


Figure 7: Plots of vorticity contours (left column), shear stress (center column) and the platelet activation parameter (right column) of (a) Valve 1 and (b) Valve 2 at 12 ms after the instant of valve closure. In the activation parameter plots, the bright red regions indicate a higher potential for platelets to be activated, while dark blue regions represent the minimal potential for the same. Larger regions of bright red for Valve 2 indicate a higher potential for platelet activation compared to Valve 1 during the initial impact and rebound phases of valve closure.

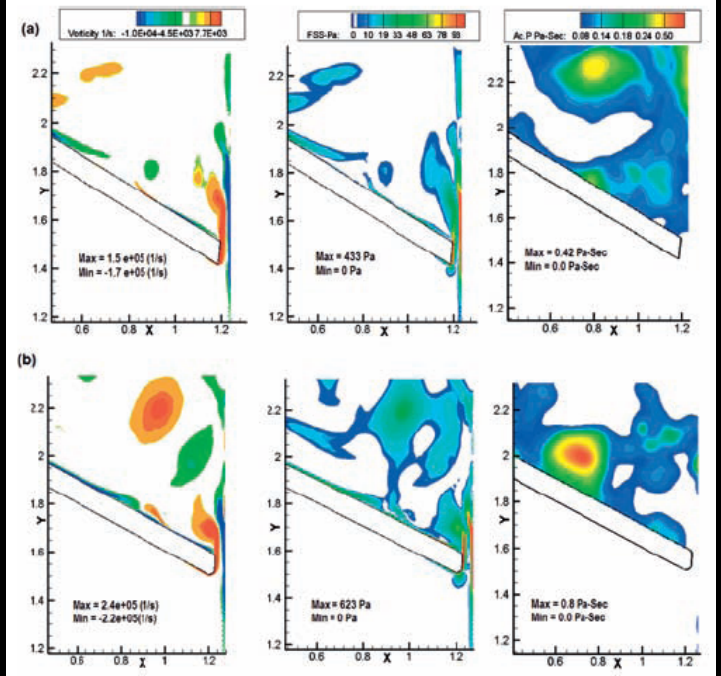
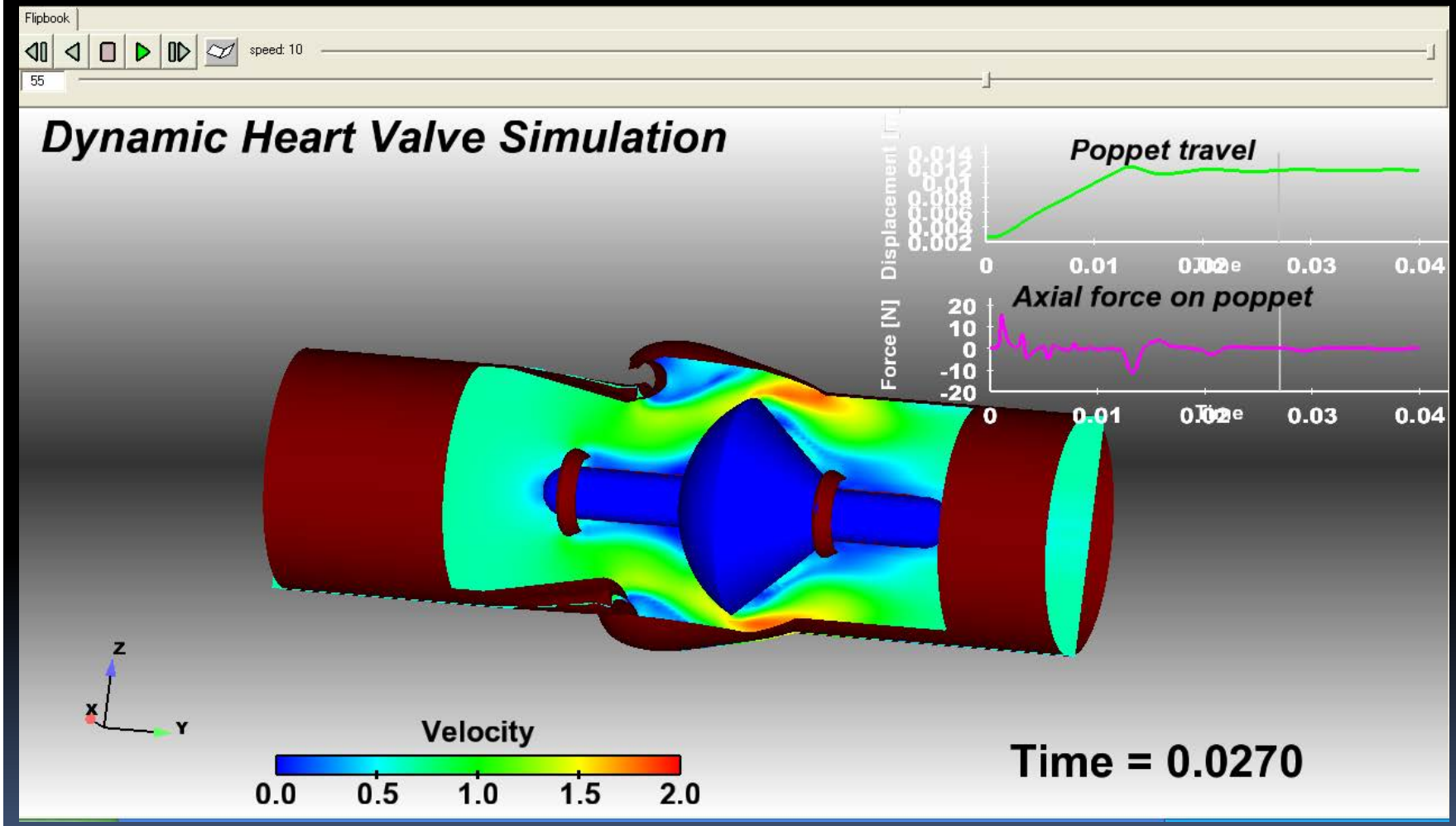


Figure 8: Plots of vorticity contours (left column), shear stress (center column) and the platelet activation parameter (right column) of (a) Valve 1 and (b) Valve 2 at 18 ms after the instant of valve closure. In the activation parameter plots, the bright red regions indicate a higher potential for platelets to be activated, while dark blue regions represent the minimal potential for the same. Larger regions of bright red for Valve 2 indicate a higher potential for platelet activation compared to Valve 1 during the initial impact and rebound phases of valve closure.

Govindarajan V, Udaykumar HS, Herbertson LH, Deutsch S, Manning KB, Chandran KB. 2009. Impact of Design Parameters on Bileaflet Mechanical Heart Valve Flow Dynamics. The Journal of Heart Valve Disease 18:535-545.

Flow dynamic modulation models



“The African Valve”

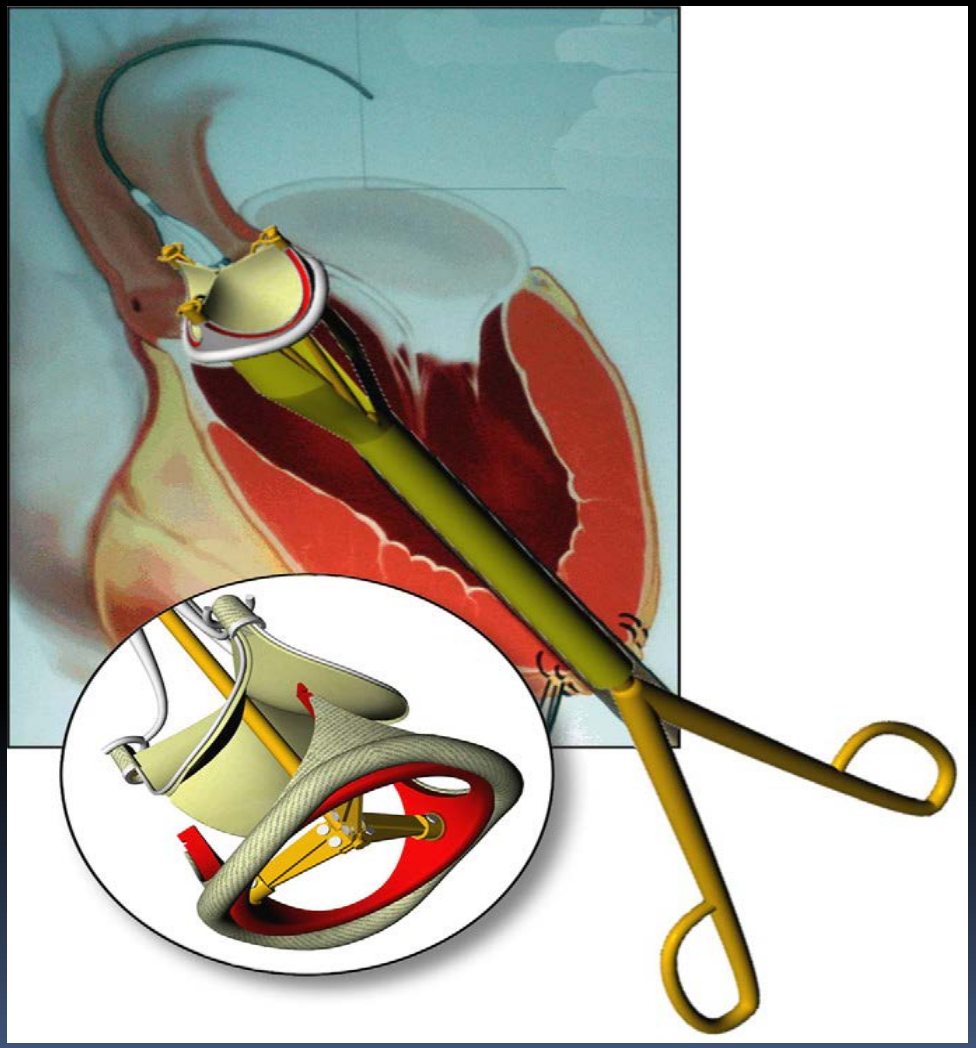


Fig. 12. Image of the “ValveXchange” transapically exchangeable bioprosthetic heart valve. Rather than being a permanent valve, the exchangeable valve is a two-piece device with leaflets that can be replaced after having worn out. In the main image, the exchange process is shown through the apex of the heart. A special trocar locks onto the “docking station” (the sewing cuff and valve stent) to stabilize the heart and valve, and a valve removal tool is inserted. The stent posts are grasped, the valve lifted from the docking station, collapsed and pulled out through the trocar. A new valve is immediately inserted and the procedure is done completely off-pump. The inset image shows a retrograde approach, in which a similar valve holder is passed from the outflow aspect to lock on to the docking station. In this approach, the valve is passed over the shaft of the valve holder during the exchange ([212], with permission

Sustainability

- Education

- Resource Allocation and the relationship between Medicine and Society

The African Surgeon

- Maximum impact at lowest cost
- Expand role
- Be a physician

Diagnostics in Africa:

- ECG/ CXR/FBC/MC&S/biochemistry
- Echo- Cardiography
- CT Scanning
- Absence of Cathlabs

African Curriculum

- General Thoracic Surgery
- Palliative paediatric cardiac surgery – Pulmonary artery banding/shunts
- Off pump paediatric surgery – PDA, Coarctation
- Closed mitral valvotomy
- Off pump coronary artery surgery
- ? Trans apical off pump valve replacements with new technology

African School

- Hannes Meyer Registrar Conference
- UFS,SCTSSA 2004 -2008
- EACTS – 2010
- CTSnet
- Active Intake requested by Ghana

Curriculum:

- Cardiac and Thoracic Surgery
- Intensive Care
- Diagnostic Procedures and Imaging
- Management

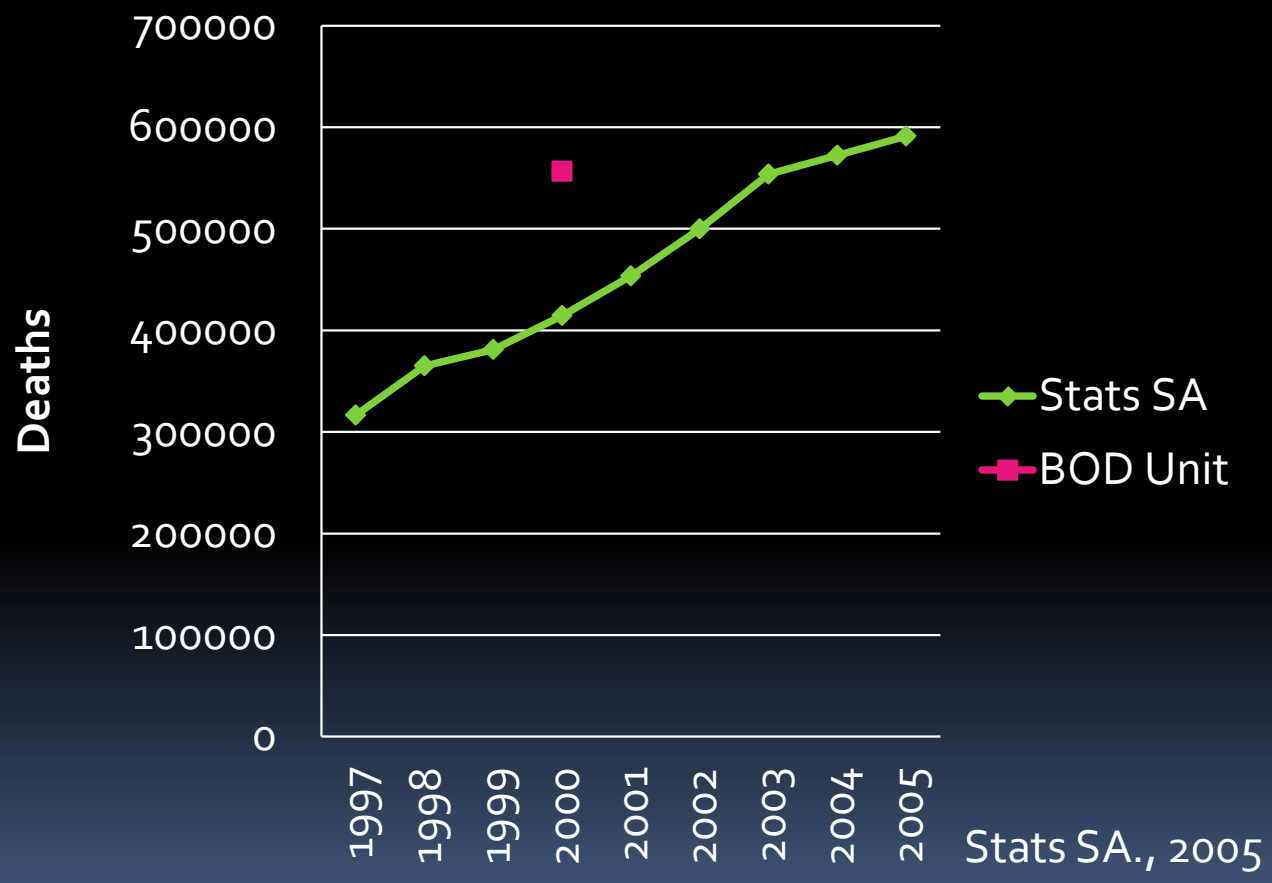
Complexity of Academic Medicine

- National Healthcare Policy

- Service Delivery – National Health
- Training – National Education
- Research – National Education
- Sustainability- National Treasury

- Provincial Authorities and Health Acts
- Local Government level

OVERALL MORTALITY PROFILE SA

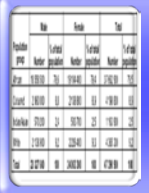


Stats SA., 2005

LOCAL DEMOGRAPHICS

Sub-Saharan Africa

- 750 + million

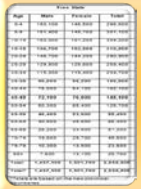


South Africa (Stats SA)

- 47 + million

Central SA

- 4.2 million
- 5.9 million incl. Lesotho



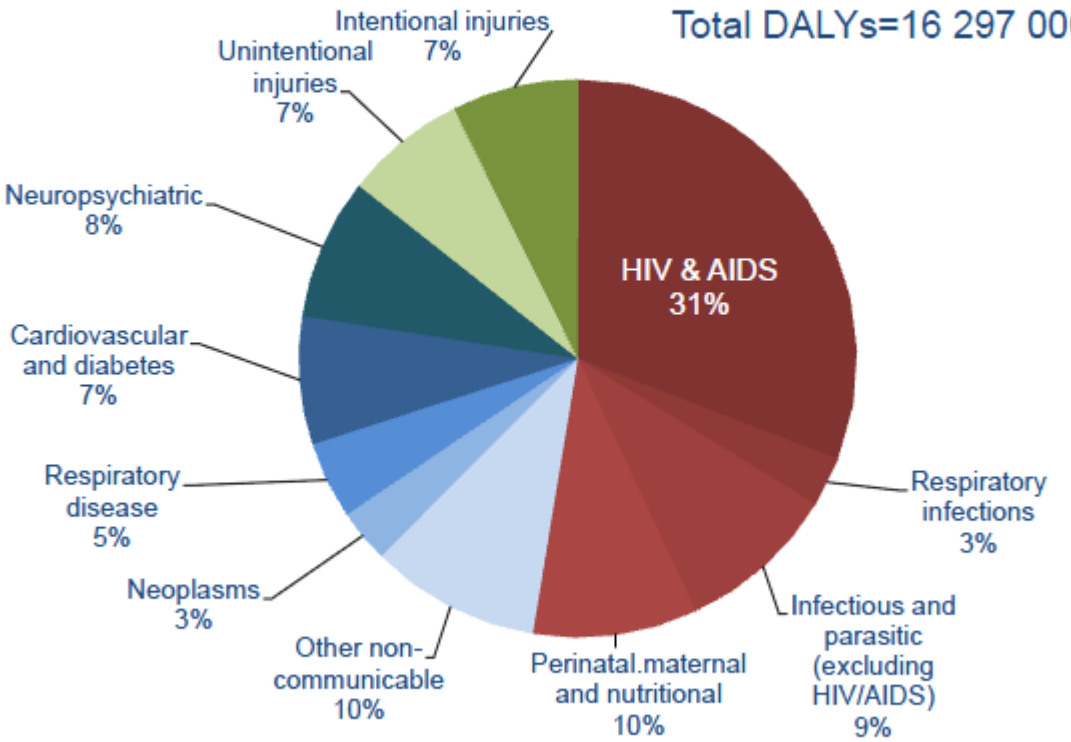
Free State

- 2.9 million

Age	Male population	Female population	Total population
0 - 4 Years	150,100	148,500	298,600
5 - 9 Years	151,400	149,700	301,100
10 - 14 Years	153,000	151,200	304,200
15 - 19 Years	156,700	153,500	310,200
20 - 24 Years	146,700	144,200	290,900
25 - 29 Years	129,800	129,600	259,400
30 - 34 Years	115,300	119,400	234,700
35 - 39 Years	90,600	96,200	186,800
40 - 44 Years	78,000	84,100	162,100
45 - 49 Years	72,100	76,000	148,100
50 - 54 Years	60,300	65,400	125,700
55 - 59 Years	46,400	53,000	99,400
60 - 64 Years	40,800	45,600	86,400
65 - 69 Years	28,200	33,000	61,200
70 - 74 Years	19,800	25,700	45,500
75 - 79 Years	10,300	13,500	23,800
80+ Years	7,600	13,100	20,700
Total	1,457,100	1,501,700	2,958,800

Mid-year population estimates - breakdown for the Free State Province, 2006

What are the causes of ill-health in South Africa? SA NBD study 2000



Source: Revised South African National Burden of Disease Estimates for 2000 Norman et al, 2006

Burden of Diseases in South Africa. Debbie Bradshaw, Burden of Disease Research Unit, SA MRC.

Key messages from *The Lancet* South Africa Series

1. Problem of colliding epidemics: 15 years after its first democratic election and liberation from apartheid, South Africa faces colliding epidemics – explosive HIV and TB epidemics, a high burden of chronic illness, mental health disorders, injury and violence-related deaths as well as a silent epidemic of maternal, neonatal, and child mortality. South Africa's per capita health burden is the highest of any middle-income country in the world. The brunt of all these disease burdens is still carried by the poorest families.

2. Paradox of supportive policies with moderate spending on health, yet worsening health outcomes. The extra health burden means more investment in health systems, at least in the medium term, and more effective implementation and effective management at all levels is needed.

3. Pressure on the health system, especially at district level to cope with the heavy burden of disease. There is also a disconnect between the public and private sectors. The priorities are:
   - prevention - whether for infections (notably HIV and TB), non-communicable diseases, injury, or for maternal, neonatal and child health (especially prevention of mother-to-child HIV transmission [PMTCT] and improved newborn health).
   - primary health care that is integrated and effective with strong management and capable use of data.
   - practising widespread scale up of successful innovations and relevant and rigorous clinical research.

4. Potential for change: South Africa could be on track for the Millennium Development Goals (MDGs) and reduce other epidemics with strategic investment, implementation, leadership and accountability for public and private sectors. Civil society has been key in promoting action for HIV/AIDS and could play a more powerful role for the wider health agenda in South Africa.

Priorities for Developing Specialists. Lessons from The Lancet Health in South Africa Series. Bongani M Mayosi, Department of Medicine, Groote Schuur Hospital & UCT.

A Point of Departure

What does the Constitution say?

- Free Access
- Services limited by available resources

- What does that mean and how does it translate to service, training and research institutions?

Reality

What is Government doing?

- Maternal Mortality, Pediatric Mortality figures
- Life expectancy

Collapse of Systems

- TB/HIV/Primary Health Care
- Hospital services
- Training platforms
- Research
- Human Resources – present and future

Problem Statement:

Current model:

Based on **SUPPLY**:

- Levels of care

based on

- Available services

based on

- Clinical expertise

determines

- Capacity

trusts

- Acuity

Alternative Model:

Based on **DEMAND**

- Burden of disease

leads to

- Case Mix

assessed by

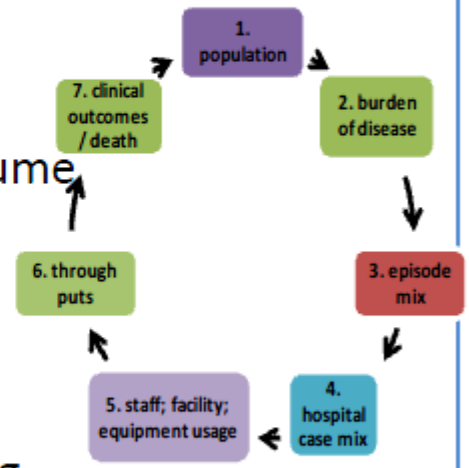
- Severity and Volume

determines

- Expertise & Staff Ratio

enables

- Monitoring & resource planning



Self justifying
(supply side capacity is validated by supply side capacity)

Case Mix
(determines structure)

Case mix analysis as a necessary tool for specialist training
Dr Brian Ruff, General Manager Clinical Risk Management, Discovery Health

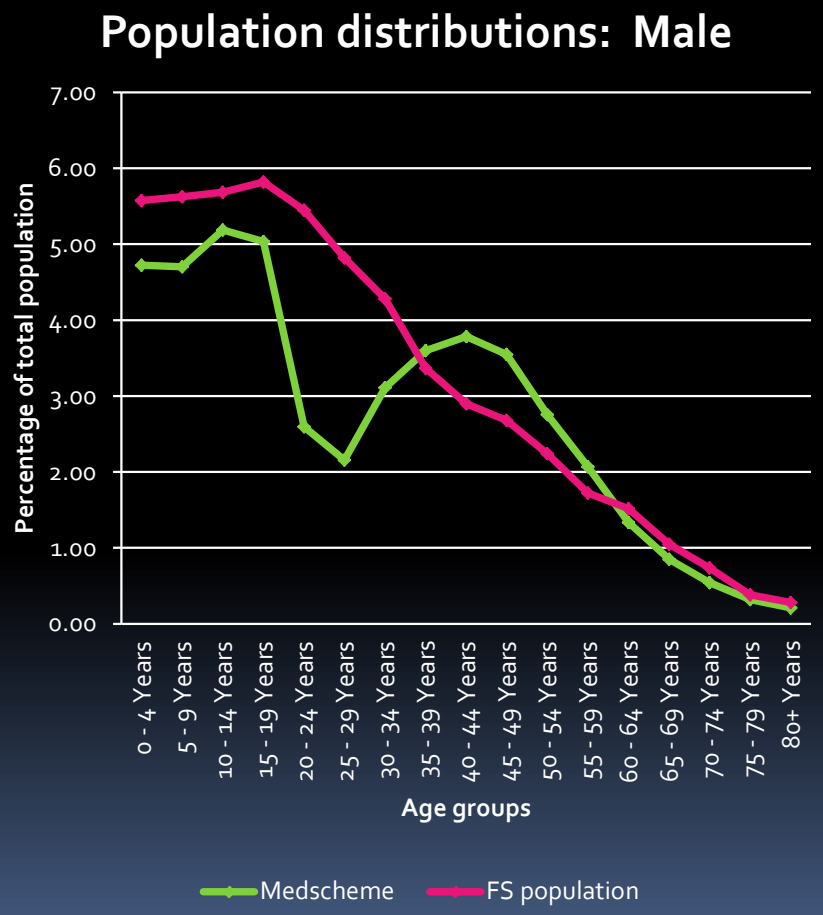
The R 1440 and R9000 annual per capita spending and the unequal service dilemma (2006)

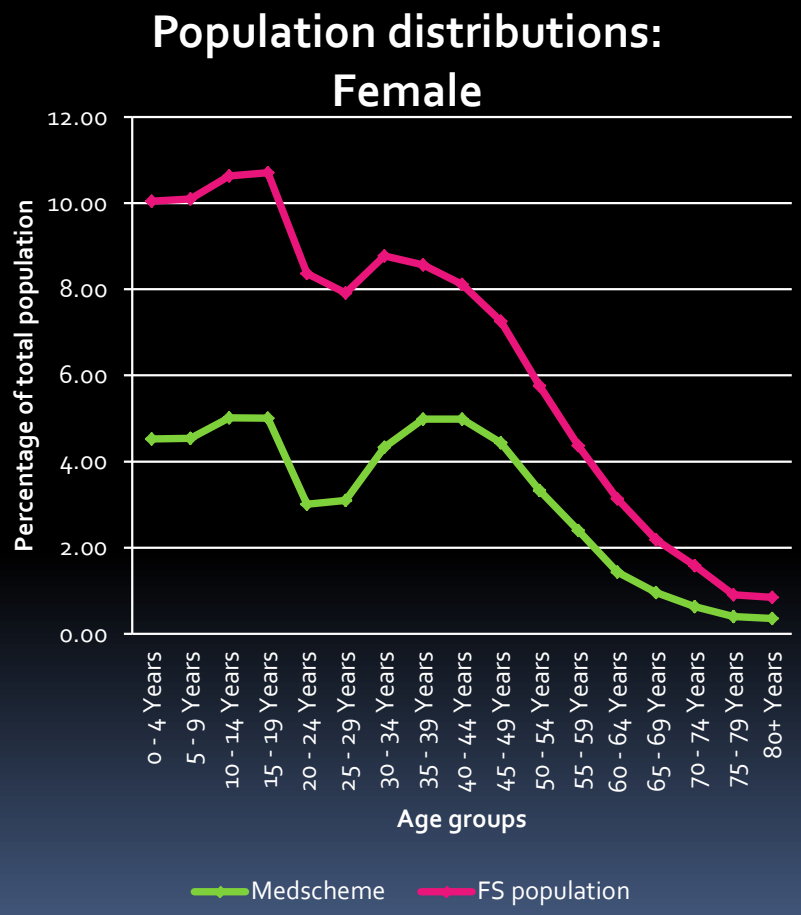
- 47 000 000 * R 9000(2006) = R423 billion
- 47 000 000* R1440 (FS 2006) = R 67 .8 billion

- Unequal services

- NHI - Universal and equal care (?R 290 billion)

Population distribution (Public vs Private)

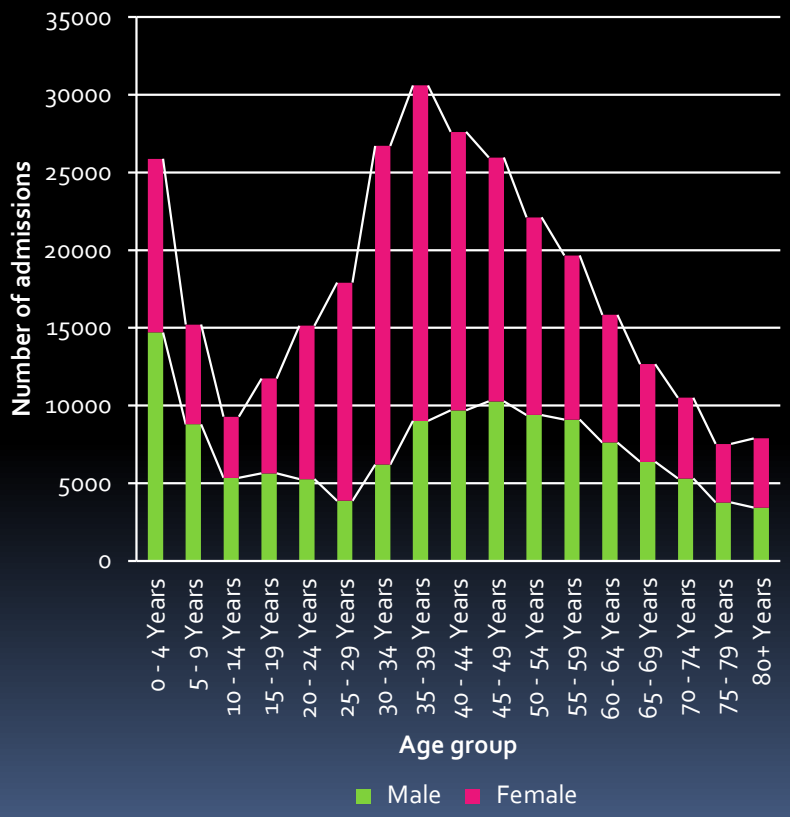




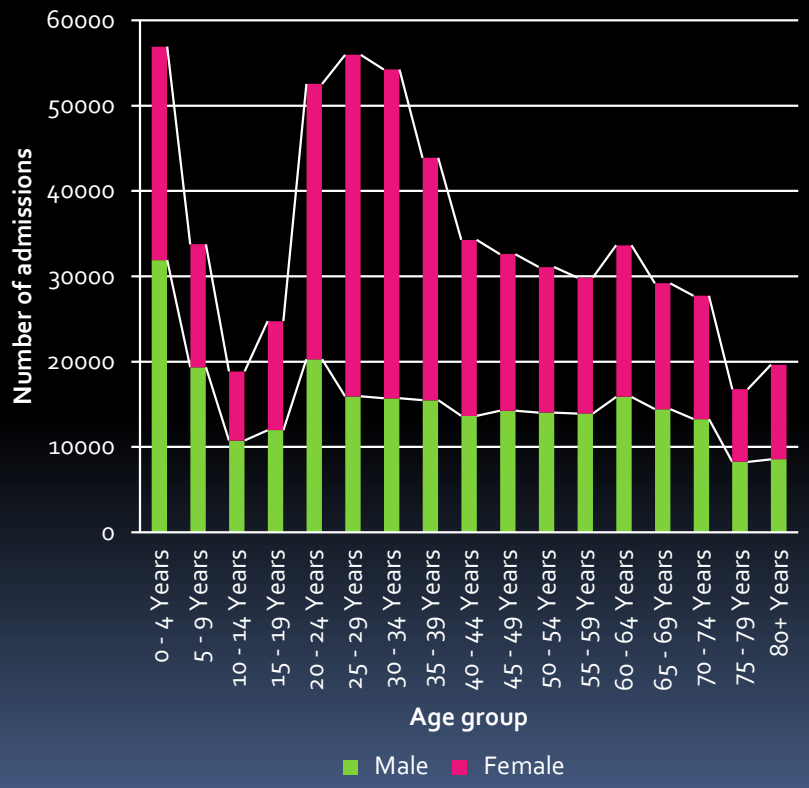
Ideal Admission rate
(Non - communicable Disease)

Admissions per 1000 population superimposed on the FS population

Medscheme admissions



Expected hospital admissions for the FS



Utilisation- Hospitalisation

- Utilisation = 221/1000 in Medscheme
- Average cost of R 15100.34 per event
- FSHS = 173/1000 planned hospitalisation (76% of above)
- Actual Hospitalisation = 93/1000
- 15/1000 are deemed tertiary

Category	Cost/ admit	Co-morbidity	Cost/ admit	Medstat Disease Stage	Cost/ admit	Age Band	Cost/ admit
Pneumonia	10,000						
Pneumonia		none	9,000				
Pneumonia		with	10,500				
Pneumonia		Major	13,000				
Pneumonia		none		1	8,000		
Pneumonia		none		2&3	11,000		
Pneumonia		with		1	10,000		
Pneumonia		with		2&3	12,000		
Pneumonia		Major		1	12,500		
Pneumonia		Major		2&3	15,000		
Pneumonia		none		1		<20	8,500
Pneumonia		none		1		20 - 60	7,000
Pneumonia		none		1		>60	9,000
Pneumonia		none		2&3		<20	11,500
Pneumonia		none		2&3		20 - 60	10,000
Pneumonia		none		2&3		>60	12,500
Pneumonia		with		1		<20	10,500
Pneumonia		with		1		20 - 60	9,000
Pneumonia		with		1		>60	11,500
Pneumonia		with		2&3		<20	12,500
Pneumonia		with		2&3		20 - 60	11,000
Pneumonia		with		2&3		>60	15,000
Pneumonia		Major		1		<20	13,000
Pneumonia		Major		1		20 - 60	11,500
Pneumonia		Major		1		>60	14,000
Pneumonia		Major		2&3		<20	15,500
Pneumonia		Major		2&3		20 - 60	13,500
Pneumonia		Major		2&3		>60	17,000

Risk adjustment / Predictive Modeling

Case mix analysis as a necessary tool for specialist training
Dr Brian Ruff, General Manager Clinical Risk Management, Discovery Health

Service package

- Quadruple Burden of Disease
- Clear objectives and strategies per quadrant
- Recognize the effect of socio-economic status, responsible social behaviour and effective government agencies
- Ring fence budgets per quadrant
- Outsource actuarial services
- Address Universal vs Two Tier system
- Universal Tax = VAT

Rights of the Health Care Worker

- Respect role in determining Quality and Quantity of Service delivery
- Medical legal position of personnel
- Rationing of services
- Working conditions (e.g. HIV, Safety)
- Remuneration packages

The Right to Quality Training

- Training accreditation- HPCSA, SAQA, Higher Education Commission
- Training Institutions – CMSA, UFS, Deans Committee
- Professional Societies – SAMA and Affiliates (e.g. CTSSA)

What are the rights of Patients?

- Human Rights Commission
- Ethical Committee of HPCSA
- Ethics SA and other Institutions
- Ombudsman

The truth is rarely pure, and never simple

Oscar Wilde

Simplicity

- Thoracic surgery
- Rheumatic fever prevention
- Detection and treatment of congenital heart disease
- New Heart Valve technology
- Coronary artery disease prevention
- Thrombolysis and Revascularisation programs
- End stage heart Programs
- African program

Complexity – Who is responsible?

Simplicity

Establish a Legal Framework for Health Care Delivery In SA

- Negotiated settlements
- Case Law
- Class Action

Establish Policy and Outsource Health Care

- Service package design, actuarial analyses
- Strategic Planning
- Management of all aspects of healthcare by professionals

Honesty, Integrity, Ability and Transparency

- Legal and Statutory Framework
- Risk Management Models for the Population
- Priorities and Rationing Principles
- Service Delivery related to Burden of Disease
- Appropriate Training
- Suitable Training Platforms
- Translational Research
- Appropriate Resource/Budget Allocations
- Outcomes Measurement
- Operational Efficiency and Management

- Simple Rules for A Complex System

Complexity – Deterrence and chaos

- $d_{yt+1} = (w_x)(c_{xt})(1-c_{xt}) - d_{xt}$

and

- $d_{xt+1} = (w_y)(c_{yt})(1-c_{yt}) - d_{yt}$

- The control parameter is w, the perceived will of the deterring country and of its potential adversaries

SA Health Reform

"Learn to do good; seek justice, correct oppression;
bring justice to the fatherless,
plead the widow's cause"

- Isaiah 1: 17

"Blessed are the merciful, for they shall obtain mercy"

-Matthews % :7

'Those who spend their wealth by night or day, in secret or in public, they shall have their reward with their Lord. On them shall be no fear nor shall they grieve.'

-Al Qur'an (2:274)

"We are all in the gutter, but some of us are looking at the stars"

- Oscar Wilde

Lord Darlington, Act III

Lady Windermere's Fan (1892)

Thanks

Mentors

- Hannes Meyer, Japie Hough, Marc De Leval, Jarda Stark, Donald Ross, Rob Kinsley, David Wheatley, Bob Frater, Sir Bruce Keogh, Marko Turina
- Colleagues
- Family and Friends
- Sponsors