Untreated symptomatic aortic stenosis (AS) portends a poor prognosis. Valve replacement is the treatment of choice. Until now, this could only be achieved by open heart surgery (SVR) and undertaken only in patients deemed operable. Technology is now available to safely replace the valve by a less invasive procedure making it applicable to more patients who might have previously been declined (transaortic valve implantation, or TAVI). Early registries and randomised controlled trial indicate that TAVI has certain advantages over medical treatment and SVR in well chosen patients.

Aortic stenosis develops as an active pathobiological process causing progressive thickening, fusion and eventually calcification of the leaflets. It may develop prematurely in a congenitally abnormal bicuspid valves, or after rheumatic fever, but most commonly is a condition of older age. The severity of the stenosis can be very accurately monitored by echo-Doppler. Typically, patients remain asymptomatic until late in the course of the disease and the stenosis becomes severe. Symptoms include breathlessness, angina, fatigue and syncope. Once symptoms intervene, the natural history untreated is poor with average survival being two to three years with a high risk of sudden death.1

Until now, SVR has been the only accepted form of treatment for symptomatic AS and is highly successful.2 However, AS is predominantly a disease of the elderly, who often have serious co-morbidities. Many of these patients are considered at high risk and may be declined surgery.

A few years ago it was reported that temporary relief may be obtained by inserting a balloon catheter percutaneously and inflating it across the calcified valve, hence separating and softening the leaflets to create a larger valve area. This benefit however is short-lived and the stenosis and symptoms invariably reappear after a few months. However, the idea of delivering a new valve percutaneously after this so-called balloon valvuloplasty has led to the development of the technology to make this possible using TAVI.3

TAVI is a technique whereby a bioprosthetic aortic valve can be successfully implanted percutaneously into an aortic root to replace the function of a calcified stenotic native aortic valve. There are currently two commercially available models of TAVI valves; one a balloon expandable model manufactured from bovine pericardial tissue (Edwards Sapiens) and the other a self-expanding model using porcine native valves (Medtronic CoreValve). TAVI has been deployed in an estimated >300 000 patients worldwide and has become an established option for the treatment of severe aortic stenosis in a specifically defined group of patients who would usually be considered high risk for, or unable to have, standard open heart surgical valve replacement. Introduction of TAVI has been initially cautious and confined to patients inoperable or at high risk of SVR.

Criteria for selection have been strictly laid down by the companies, professionals and societies in which it has been used.
These include the need for patients to be symptomatic with severe AS, at high risk of AVR (Euroscore of >20% and/or STS score >10%) with suitable aortic root size and morphology and with a prospect of reasonable improvement in duration and quality of life. The assessment includes a detailed clinical evaluation, Echo Doppler, CT scan of aorta and peripheral vessels and coronary angiography. The final decision to proceed should be made by a combined team of surgeon, cardiologist, and physician. AS is a surgical condition and the inclusion of a cardiac surgeon in this decision making process is essential.

The implant is usually made via the femoral artery or by an alternative route such as the transapical approach using a lateral thoracotomy incision, or via a limited sternotomy through the ascending aorta or via the left subclavian artery. A general anaesthetic is the standard, although some procedures may be done under local anaesthetic.

Early experience from large Registry data from Europe using both the balloon expandable Edwards Sapiens valve and the self expanding Medtronic CoreValve indicated that TAVI was highly successful with a technical success rate of 98%, a 30-day mortality rate of 12% and a stroke rate of 3-4%. The patients were mainly octogenarians with a high prevalence of coronary and peripheral vascular disease with a history of previous coronary bypass surgery in >25%. Conversion to SVR was very rare. There has been a one-year survival of about 75%, with most of the late deaths being due to associated co-morbidities. The main technical challenges are a small, but real, incidence of stroke and of paravalvar leak, whilst patient selection is the key to a more sustained success.

TAVI was launched in SA in September 2009 using exclusively the balloon expanded Edwards Sapiens Valve. Three centres of excellence were established in Cape Town, Johannesburg and Durban. To date 100 cases have been performed with published results in keeping with the best registry data presented in Europe. A further two more centres have now been trained in Pretoria and Durban. Each centre has established a team consisting of a cardiologist, cardiac surgeon and cardiac anaesthetist with decisions being made and procedures performed for each patient by the whole team.
The total cost has been R350 000 - R370 000. There has been no consistent funding policy among funders in SA as yet. A few fund it completely, some funders decline outright with most funding it partially with significant co-payments from the patient. The self-expanding Medtronic CoreValve has not yet been used in SA.

Recently we have seen the publication of the first randomised controlled trial from US using exclusively the Edwards Sapiens bovine pericardial valve. The PARTNER trial has Cohort A comparing TAVI to SVR in high risk patients; and Cohort B compares TAVI with best medical management in inoperable patients.

Cohort B results were published in NEJM in September 2010. In this study, 358 patients were randomised and TAVI was demonstrated to show a substantial benefit compared to best medical treatment (BMT). One-year death rate was 30.7% with TAVI vs 50.77% with BMT (p<0.001); a >50% reduction in composite of death plus rehospitalisation: 42.5% vs 71% with BMT (p=0.001) and a similar benefit in NYHA symptoms III/IV 25% with TAVI vs 58% with BMT at one year.

In addition, in March 2011, the cost effectiveness analysis of Cohort B was presented with total costs at one year in the TAVI group being nearly half of that in the BMT group ($29 352 vs $52 724 p=<0.001) making it a highly cost-effective alternative to BMT.6

Cohort A randomised 699 high risk patients to TAVI or SAVR and these results were also presented in March 2011. TAVI vs SVR mortality at one month were (3.4% vs 6.5% p=0.7); and at one year (24% vs 26.8% p=0.04). TAVI therefore matched SVR in this group of high risk patients.7

In both Cohorts there was a small, but increased risk of stroke at one year and more vascular complications in the TAVI groups, and the SVR group had a higher risk of bleeding and atrial fibrillation. These results therefore indicate that TAVI is superior to BMT and non-inferior to SVR, with treatment choices to be made according to the specific complication possibilities. On the strength of this, FDA approval for the Edwards Sapiens valve in these well defined groups of patients is expected in the near future, which is expected to accelerate the use of this technology enormously.

These results therefore indicate that TAVI is superior to BMT and non-inferior to SVR, with treatment choices to be made according to the specific complication possibilities

Conclusions

TAVI is proving itself to be a reasonable option in the management of severe symptomatic aortic stenosis in a select group of patients. It appears to better and more cost effective to BMT in inoperable patients and is at least, equal to SVR where the operative risks are considered to be high. It is not proven yet to be an option in patients who are good candidates for open heart surgery, where SVR remains the standard of care. Chosing the most appropriate patients for TAVI is critical and a multidisciplinary approach vital. The high costs of the procedure mount a challenge in health budgets, but with the rapidly progressing technologies and new models the pricing should become more competitive.

References

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Genetic ownership and sharing

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The body is a source of instrumental value to others. It provides organs, tissues, gametic materials and cells that can sometimes have life-saving benefits to patients and benefits to physicians and researchers, in addition.

For this reason, society has approved (with some debate) the acquisition of these materials in various ways. This may be through gifts and donations, such as of blood, marrow, organs and sperm and through the sale of hair, sperm and blood (Campbell 1992:36). However, what has become a major debate is how DNA can, and if it ought to be commoditised; and how and if individuals can keep their genetic information private, or whether it ought to be shared with all.

The rise of genetic research and information has transformed how scientists study, diagnose and analyse disease. Molecular-level information would have been unthinkable 100 years ago. From the time that Watson and Crick discovered the structure of DNA in 1953, the race was on to discover the genetic code.

This was achieved in 2003 and now the function of every part of the genome is the main concern of those wanting to advance genetic breakthroughs even further.

This revolution in medicine – molecular genetics – has not only transformed the way that diseases are diagnosed, but also how they are treated.

Biotechnological advances in human genome mapping, so-called predictability or susceptibility testing, heritage testing, biobanking, pharmacogenomics, reproductive technologies and novel diagnostic techniques have transformed access to genetic information. Along with this accessibility come complicated ethical questions of access to and storage of information, security thereof, privacy, consent and, the focus of this article, ownership.

Genetic information

Genetic information broadly refers to all of the currently known genetic data for all living organisms. It can also refer to the genetic composition of one individual and their families.

Many individuals express concern that a positive finding on a genetic screening test will result in discrimination and stigmatisation because they are out of the norm. Another concern raised is that the release of genetic information may result in an individual's loss, for example, of the inability to get insurance, or employment if genetic information crosses into the public domain (Orentlicher 1990: 1005).

Nowadays, genetic information is used not only in the doctor’s office, but also beyond. For example, genetic information in a variety of forms is found in courts of law as a way of proving or disproving paternity, determining immigration status, in criminal cases involving genetic materials, by the military for soldier identification purposes and by medical aids and other insurance companies.

Genetic information is seen as different from other biological tissues in that it potentially involves more “broad-ranging features of an individuals’ health status” and carries implications for relatives (Skene 2002: 49, Gillet and McKergow 2007: 2094).

Within the ambit of health and wellness, genetic information is being used in reproductive and fertility health, disease diagnosis and treatment, epidemiological studies, bioinformatics and pharmacogenomics.

The complex questions about who ought to benefit and about how individuals, families and communities can be protected against harms are most pressing at this time.

Genetic information is seen as different from other biological tissues in that it potentially involves more “broad-ranging features of an individuals’ health status” and carries implications for relatives.
Genetic exceptionalism

Despite that the gifting and sale of certain parts of the body has become a (debatably) acceptable practice in some parts of society, such as through organ donation, blood donation, sperm donation, ovum selling, selling of breast milk and the like, there has been an attitude of what is termed “exceptionalism” regarding genetic information. This is most likely due to the ‘mystique’ around genetics, since the concepts can be highly abstract and difficult to understand, but there also tends to be much suspicion about the nature and power of the contents of genetic information.

Some arguments for and against genetic exceptionalism

The arguments for classifying genetic information as exceptional are generally grounded in the belief that genetic information is uniquely sensitive information owing to its “prophetic, predictive, shared and symbolic nature” (McGuire et al. 2008: 500).

The most obvious example of this is that of the genetic relationship between monozygotic twins. Since they share such a high percentage of their genetic makeup, if the one were to discover a deleterious mutation, it would be highly likely that the other twin would have it as well. As familial relationships move further apart (genetically), this probability decreases, but the information may nevertheless be relevant to family members and therefore affect decisions that they make about their healthcare, and in some cases, reproductive choices. This is because an individual receives not only information relating directly to her, but she also receives the genetic history of her family or in some instances, her extended family (husband, mother-in-law, father-in-law). Thus, the argument goes, genetic information should be considered as exceptional. It has been argued that genetic information thus should be offered to all family members as they have a ‘right to know’ (O’Neill 2001: 703-704).

On the other hand, it may be argued that genetic information is neither ‘exceptional nor ethically different from other medical information” (Murray 1997:63). Murray argues that there are medical issues such as elevated cholesterol or exposure to an infectious disease that perhaps ought to be shared with family members as well.

There may also be an argument for sharing of information for public health benefit and so, the age old tension between individual rights and legitimate public health needs arises.

Ownership of genetic information

Since genetics touches so intimately on an individual’s life, as does any other health-related information, it is often thought of as falling into a property “paradigm” since individuals tend to think of themselves as proprietors of their genetic material (Andrews 1986: 29; de Witter and ten Have 1997: 51; Gillert and McKergow 2007: 205; Campbell 1992: 40).

In their discussion on ownership of genetic material and information, de Witter and ten Have (1997) identified a few possible owners: a) the individual with the particular genome; b) the scientist or company that discovered the particular genes or nucleotide sequences; c) humankind in general (as noted in the UNESCO declaration).

I would add another category: a group of people who happen to share an identical set of specific nucleotides for a sequence in question.

In order to discuss the issue of genetic ownership, a deeper debate arises: can a person justifiably make the claim to be owners of themselves?

Can a person justifiably make the claim to be owners of themselves?
Despite the strong intuition that a person is the owner of themselves, there is little principled moral argumentation to prove that people are indeed in possession of rights of self-ownership. In spite of this, there are strong legal and legal-ethical arguments that uphold individual liberty, freedom, autonomy and dignity aimed to protect the individual from intrusions on or into her body (bodily integrity).

The philosopher, Immanuel Kant argues that people ought to be treated as ends in themselves (not used). They are ends in themselves because they are rational beings that have inherent worth and dignity. Because of their intrinsic value, they are deserving of respect at all times. This respect is to be applied by a person towards his- or herself as well as towards others.

In applying this respect, some of the principles of individual liberty are protected by this principle of ends. On the other hand, freedoms that constitute an indignity towards self and others, such as commoditisation (selling) of the body, are prohibited by this view.

Kant’s views against self-ownership are underpinned by the principle of respect for persons, a privilege of man by way of his humanity. Taylor (2004: 71) explains Kant’s position writing, “In MM [Metaphysics of Morals], Kant asserts that someone can be his own master but cannot be the owner of himself (cannot dispose of himself as he pleases) - still less can he dispose of others as he please - since he is accountable to the humanity in his own person.”

Since, the principle of self-ownership allows actions such as self-mutilation and suicide and asserts that the individual is the final arbiter over herself; it is against the principle of treating oneself with dignity, according to Kant.

Robert Nozick (1974), a libertarian who argues for self-ownership, borrows from Kant to argue that as humans with inherent value and dignity we ought to have the right to freedom and from John Locke to argue that we ought to have the right to private property.

Where Kant and Nozick agree is that a person should never be treated merely as a means to an end. On the issue of how a person should treat themselves, Nozick believes that that is a matter of personal liberty and that the person should be able to make their decisions without outside interference - that is, they are self owners and free to choose how they treat themselves.

Kant, in fact shares the belief in personal liberty. He sees voluntariness and freedom from interference as essential to autonomy. Where they disagree is on the matter of respecting oneself and what that respect means; that is, what dignity means. Kant believes that people have a duty to respect themselves as much as they do to respect others.

If Kant, who argued for individual freedom, autonomy and choice as well as for respect for humanity, were present in today’s world, how would he view ownership of genetic information and the exceptionalism debate? It is difficult to imagine how he would apply these moral principles to sharing, or not sharing information and owning or not owning it.

If we were to create a maxim that said, “One should always offer to disclose one’s genetic information to family members or relevant others” I would consider this right and appropriate, and I think Kant would agree as I would be demonstrating my duty to respect myself and for others. It shows Kant’s concept of autonomy as the principle of morality.

On the other hand, if we were to create a maxim that said, “One should always disclose one’s genetic information.” I would hesitate to act on this maxim. While the principle of respect for persons denies that a person can be a self owner, it also implies that we have autonomy, freedom and choice - individual freedoms are still upheld.

Moreover, and in a different perspective, the concept of sharing or providing one’s genetic information per se may not be the real issue at hand. Sometimes, benefits may have to be weighed against harms and perhaps the concept of dignity needs to be re-evaluated.

If, for example, gene patenting does not diminish a person’s freedom, autonomy or rational will but does provide much-needed research for significant global health benefits, and if those health benefits can be distributed evenly among the rich and poor, then there are some powerful moral arguments in favour of the practice. However, since there is a disparate distribution of goods and harms globally and commercial ends are seldom in pursuit of equality, patenting may be wrong, but not for reasons of genetic self-ownership.

**Despite the strong intuition that a person is the owner of themselves, there is little principled moral argumentation to prove that people are indeed in possession of rights of self-ownership.**
It may well be, that the intense desire that most people have to control their genetic information is not because they feel they have a philosophical attachment to their information, but rather that they fear the negative outcomes they may experience if they lose control over that information. It may well be that in a world with less stigmatisation or fairer systems, people would be more willing to share and that may well be the right thing to do.

References
CPD Ethics Article Questions

Questions

1. If the body is referred to as having ‘instrumental’ value this means that:
   A) It is a means to an end
   B) It is intrinsically valuable

2. Do you think the idea of gifting body parts or products is morally equivalent to owning them?
   A) Yes, if you can give something away then you own it
   B) No, ownership implies a greater level of sovereignty

3. Genetic information is exceptional when compared to other medical information because:
   A) It is predictive and shared among family members
   B) Because of the advancements in molecular biotechnological techniques

4. Genetic information is not exceptional because:
   A) Often diseases, which are not genetic may also have consequences for family members
   B) The functions of genes have not been fully elucidated

5. The principle of ends states that a person should never be treated as a means only but also as an end in themselves
   A) True
   B) False

6. Kant was against self-ownership as it implies that people can commit suicide
   A) True
   B) False

7. Kant was against suicide as it
   A) Constitutes an indignity towards the self
   B) Is the same as ‘playing God’

This is to state that I have participated in the CPD-approved programme and that these are my own answers.

Signature ___________________________ Date ___________________________

INSTRUCTIONS: 1. Use a blue or black pen only. 2. Answer all questions. 3. Email sheet to karin.mosselson@media24.com or post sheet to PO Box 784698, Sandton, 2146 or fax to: +27 086-729-1490. 4. SPECIALIST FORUM holds no responsibility for any answers not received by fax or post. 5. Credit for these CPD modules will be issued for the year at a later date.
Abstract
The purpose of this systematic review of the literature was to determine the association of sepsis with mortality in the severely injured adult patient by means of a comparative analysis of sepsis in burn and trauma injury with other critically ill populations.

Methods
The MEDLINE (PubMed), Cochrane Library, and ProQuest databases were searched. The following keywords and MeSH headings were used: 'sepsis, septicemia', 'septic shock', 'epidemiology', 'burns', 'thermal injury', 'trauma', 'wounds and injuries', 'critical care', 'intensive care', 'outcomes' and 'mortality'. Included studies were clinical studies of adult burn, trauma, and critically ill patients that reported survival data for sepsis.

Results
Thirty-eight articles were reviewed (nine burn, 11 trauma, 18 general critical care). The age of burn (<45 years) and trauma (34-49 years) groups was lower than the general critical care (57-64 years) population. Sepsis prevalence varied with trauma injured patients experiencing fewer episodes (2.4-16.9%) contrasted with burn patients (8-42.5%) and critical care patients (19-38%). Survival differed with trauma patients experiencing a lower rate of mortality associated with sepsis (7-36.9%) compared with the burn (28-65%) and critical care (21-53%) groups.

Conclusions
This study is the first to compare sepsis outcomes in three distinct patient populations: burn, trauma and general critical care. Trauma patients tend to have relatively low sepsis-associated mortality; burn patients and the older critical care population have higher prevalence of sepsis with worse outcomes. Great variability of criteria to identify septic patients among studies compromises population comparisons.

Reference
To systematically review and quantitatively synthesise all randomised controlled trials (RCTs), comparing important outcomes in ventilated critically ill patients who received a tracheotomy early or late.

**Methods**
A systematic literature search of PubMed, CINAHL, Embase, and the Cochrane Central Register of Controlled Trials, the National Research Register, the NHS Trusts Clinical Trials Register, and the Medical Research Council UK database was conducted using specific search terms. Eligible studies were RCTs that compared early tracheotomy with either late tracheotomy or prolonged endotracheal intubation in critically ill adult patients.

**Results**
Seven trials with 1,044 patients were analyzed. Early tracheotomy did not significantly reduce short-term mortality (relative risk 0.86, 95% confidence interval 0.65 to 1.13), long-term mortality (0.84, 0.68 to 1.04), or incidence of VAP (0.94, 0.77 to 1.15) in critically ill patients. The timing of tracheotomy was not associated with a markedly reduced duration of MV (weighted mean difference -3.90 days, 95% confidence interval -9.71 to 1.91) or sedation (-7.09 days, -14.64 to 0.45), shorter stay in ICU (-6.93 days, -16.50 to 2.63) or hospital (1.45 days, -5.31 to 8.22), or more complications (relative risk 0.94, 95% confidence interval 0.66 to 1.34).

**Conclusions**
The present meta-analysis suggested that the timing of tracheotomy did not significantly alter important clinical outcomes in critically ill patients. The duration of MV and sedation as well as the long-term outcomes of ET in mechanically ventilated patients should be evaluated in rigorously designed and adequately powered RCTs in future.

Reference

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The timing of tracheotomy in critically ill patients undergoing mechanical ventilation

To systematically review and quantitatively synthesise all randomised controlled trials (RCTs), comparing important outcomes in ventilated critically ill patients who received a tracheotomy early or late.

**Methods**
A systematic literature search of PubMed, CINAHL, Embase, and the Cochrane Central Register of Controlled Trials, the National Research Register, the NHS Trusts Clinical Trials Register, and the Medical Research Council UK database was conducted using specific search terms. Eligible studies were RCTs that compared early tracheotomy with either late tracheotomy or prolonged endotracheal intubation in critically ill adult patients.

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Reference

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**Haemodynamic parameters to guide fluid therapy**

The clinical determination of the intravascular volume can be extremely difficult in critically ill and injured patients as well as those undergoing major surgery. This is problematic because fluid loading is considered the first step in the resuscitation of haemodynamically unstable patients. Yet, multiple studies have demonstrated that only approximately 50% of haemodynamically unstable patients in the intensive care unit and operating room respond to a fluid challenge. Whereas under-resuscitation results in inadequate organ perfusion, accumulating data suggest that over-resuscitation increases the morbidity and mortality of critically ill patients.

Cardiac filling pressures, including the central venous pressure and pulmonary artery occlusion pressure, have been traditionally used to guide fluid management. However, studies performed during the past 30 years have demonstrated that cardiac filling pressures are unable to predict fluid responsiveness.

Accumulating data suggest that over-resuscitation increases the morbidity and mortality of critically ill patients.

During the past decade, a number of dynamic tests of volume responsiveness have been reported. These tests dynamically monitor the change in stroke volume after a maneuver that increases or decreases venous return (preload) and challenges the patients’ Frank-Starling curve.

These dynamic tests use the change in stroke volume during mechanical ventilation or after a passive leg raising maneuver to assess fluid responsiveness. The stroke volume is measured continuously and in real-time by minimally invasive or noninvasive technologies, including Doppler methods, pulse contour analysis, and bioreactance.

Reference
Clinical characteristics and outcomes of critically ill obstetric patients: a 10-year review

Pregnancy and delivery can involve complications that necessitate admission to critical care facilities. The objective of our study was to assess the incidence, indications, and outcomes of obstetric patients requiring admission to an intensive care unit (ICU) in a tertiary care hospital, in Saudi Arabia.

Design and setting
Retrospective cohort study of consecutive obstetric admissions to the ICU at the King Abdulaziz Medical City over a 10-year period.

Patients and methods
We collected baseline demographic data and acute physiology and chronic health evaluation II (APACHE II) scores. ICU mortality was the primary outcome.

Results
Over 10 years, 75 obstetric patients were admitted to the ICU, and 59 of these patients (78.6%) were admitted during the antepartum period. The main obstetric indication for ICU admission was pregnancy-induced hypertension (21 patients, 28%) and the leading non-obstetric indication was sepsis (12 patients, 16%). The APACHE II score was 19.59 (15.05). The predicted mortality rate based on the APACHE II score was 21.97%; however, there were only six maternal deaths (8%) among the obstetric patients admitted to the ICU.

Conclusion
The overall mortality was low. A team approach facilitated the application of optimal care to these patients. Obstetric patients had better outcomes than those predicted by the APACHE II scores. Appropriate antenatal care is important for preventing obstetric complications.

Reference
Diabetes:
State of the nation

Diabetes is any disorder that results in raised serum glucose levels and the last time anyone bothered to count there were 42 different causes. One of the first mistakes healthcare providers make when treating diabetic is forgetting to ask why. Why is this patient’s blood sugar high? Which of the 42 possibilities is the cause in this patient? Asking this question will hopefully lead to further investigations and then to a proper diagnosis. Only once you have a proper diagnosis can you think about management. Fortunately most of the time the diagnosis will be either Type 1 or Type 2 Diabetes but every now and again you will find a cause that is delightfully different like Acromegaly or Cushing’s and sometimes it will be a small but important distinction such as diagnosing Type 1 diabetes in a 65yr old or Monogenic Diabetes in a child. These are not trivial distinctions but are Diagnoses that will dramatically change management and outcomes in the affected patient and therefore have a huge impact on that person quality of life.

Let’s start with Type 1 diabetes which is an autoimmune disorder and as such confers and increased risk of developing other autoimmune conditions. Autoimmunity in Type 1 diabetes occurs in a genetically susceptible patient following some kind of trigger. There is cell mediated destruction of Beta-cells in the pancreas resulting in insulinopenia. Insulin is required in most cells of the body to open channels in the cell membrane that allow glucose to diffuse in. Insulinopenia therefore results in accumulation of glucose in the blood and glucopenia intracellularly. The intracellular glucopenia triggers ketogenesis as an alternate energy source, ketogenesis unfortunately results in acidosis and things fall apart.

Type 1 Diabetes is therefore a pure hormone deficiency and treatment is as with any hormone deficiency physiological replacement. Regrettably physiological replacement of insulin is fantastically complicated and currently near impossible to achieve in any patient all of the time. Replacement is generally done in 2 phases.

First we replace basal insulin secretion which is not the flat line that is often illustrated but rather follows a circadian rhythm that mirrors the circadian secretion of the important counter-regulatory hormones Cortisol and Growth Hormone. The only way this can be mimicked with any real physiological accuracy is with the use of insulin pumps. These are wickedly clever and even more wickedly expensive but are infinitely modifiable allowing personalised adjustment of basal insulin replacement. Because we don’t live in a fairytale, basal insulin is replaced in most patients using either human NPH insulin or preferably, because however you look at it it is much better, a long acting insulin analogue.

The next phase of replacement is the insulin surges which normally occur in response to oral glucose ingestion conventionally called insulin boluses.
Again insulin pumps with their wicked cleverness are the best way of doing this as they allow multiple (any often in children tiny) needle free boluses anytime carbohydrates are ingested. To make it even easier they have a little wizard which helps calculate the correct insulin bolus dose. This allows the patient to follow a completely normal healthy diet which is the ideal aim in the treatment of a Type 1 Diabetes. Again in the real world most patients will give insulin boluses using either human insulin or again because it is really so much better Rapid Acting Insulin Analogues. This does require a slight modification to diet. To limit the number of needle pricks a day to a reasonable 3-4 we teach patients to cluster carbohydrate ingestion into 3-4 meals per day.

Of course all of this is only possible if there is some way of monitoring blood glucose levels because contrary to popular wisdom we can’t “feel” the difference between a Glucose level of 4 and 20. Again the wickedly clever insulin pumps have the advantage here where newer models have built in continuous glucose monitors. These measure interstitial fluid glucose levels which lag behind plasma glucose by about 20 minutes. This really is the future of diabetes care which will within the next decade or 2 develop into complete closed loop systems requiring little user input. Until this glorious time comes most patients rely on the trusty finger prick glucose monitors measuring glucose levels before and 2 hours after meals as well as anytime they have reason to be concerned that glucose levels are either too high or too low.

Of course applying all of this requires ongoing and intensive patient and family education and access to 24hr support to help them deal with emergencies at home. Glucometers and insulin pumps can be downloaded on the patient’s home computer and emailed to their endocrinologist for interpretation and adjustment of doses. The days of admitting Type 1 diabetic patients to achieve control or manage emergencies are with rare exceptions long gone. Unfortunately there are a few dinosaurs among us who survive the meteorites of progress.

Because of the increased risk of developing other autoimmune diseases and endocrinopathies the Endocrinologist always has to be ever vigilant.

Now Type 2 diabetes is an altogether different kettle of fish! Here the pathogenesis is a mix and match of something mysteriously called “insulin resistance” and beta-cell failure.
The long and the short of it is that under a given circumstance the amount of insulin required to achieve the same reduction in plasma glucose levels is increased.

The sum of these 2 conditions is that a person with genetically vulnerable beta-cells that are stressed under conditions of insulin resistance are more likely to eventually fail and dysglycaemia followed by overt diabetes develops. Only once you understand this can you start to intelligently treat Type 2 diabetic patients.

Logic, supported by evidence based medicine suggests that the starting point should be to tackle the insulin resistance. Tackling the insulin resistance means tackling the cause which is mostly lifestyle, exercise, diet and most importantly weight. This explains why weight loss is such an effective treatment for type 2 diabetes. We see this most dramatically after Bariatric surgery which in the majority of diabetic patients results in if not quite a “cure” at least a prolonged remission from clinical disease. It is a bit like taking an old failing engine out of a truck and putting it in a mini where it can tick over unstressed for years.

We also have a few drugs that help with insulin resistance, Metformin is the most widely known and used and is particularly effective at reducing hepatic insulin resistance (the first organ sugars meet after absorption). The thiazolidinediones held promise for a few years until their rather nasty side effects led to withdrawal and significantly limited the use of those left.

Once we have exhausted our options for reducing insulin resistance (which except for Bariatric Surgery tends to happens rather fast) we need to turn our attention to the failing beta-cells. Here our options have recently been enticingly expanded. Until very recently we were limited to super-stimulating the beta-cells using either sulphonylureas or less popularly Meglitinides. Although these drugs are highly effective they had a few disadvantages including the risk of hypoglycaemia especially in the elderly and patients with impaired renal function. There is fairly good evidence to suggest that they more rapidly precipitated eventual beta-cell failure. A bit like fitting a turbo-charger to our failing truck engine would for the benefit of a brief period of increased power speed its ultimate demise.

A new class of drugs are those that work via the incretin system. This is a group of hormones that are secreted by specialised endocrine cell in the intestinal mucosa that potentiate the release of insulin by beta cells in response to orally ingested carbohydrates. It is these hormones that play a major role in the improvement of Diabetes following Bariatric surgery much of which occurs before any actual weight loss. The most well studied of these is GLP1 (Glucagon like peptide 1). Although it has been possible to synthesise it for years its clinical usefulness was limited by its half-life of minutes. It was a chance finding of a similar peptide in the saliva of Lizards called Gila monsters which was resistant to degradation by the Enzyme DPP4(Dipeptidyl Peptidase 4) which led to this new class of drugs the GLP1 analogues. One of these is already on the market in South Africa and another is to follow this year with more in hot pursuit.

These drugs have a few important advantages. They do not cause weight gain in fact there is often a clinically significant amount of weight loss. They do not speed beta-cell failure and there is tantalising evidence to suggest they may even encourage recovery of some lost Beta-cell function. The disadvantage is that they are like insulin given by subcutaneous injection between 2 times daily to once monthly.

A variation on this theme is the recently launched DPP4 inhibitors. These are conveniently oral tablets that inhibit the metabolism of naturally secreted GLP1 increasing its half life and therefore its efficacy. They are slightly less potent than then GLP1 analogues which are in turn slight less potent than the sulphonylureas but again are not associated with weight gain or beta-cell exhaustion.

Thus far we have discussed the pathophysiology of diabetes and the various treatment options. The final step is integrating this into a coherent treatment regime that we can apply to patients. Treatment of diabetes can be considered from an individual patient point of view and also from the view of the society in which that patient lives. It is often assumed that these 2 views are divergent with the individual patient perspective wanting the best available and therefore most expensive and society wanting the cheapest and therefore less effective. There are few points we need to consider before starting to consider a treatment regime.
Diabetes: State of the nation

- Diabetes is a worldwide epidemic that threatens to swamp the health capabilities of even the wealthiest countries.
- We are currently failing dismally in our efforts to achieve the recommended targets of glycaemic control as measured by HbA1c.
- Treatment costs must include all aspects of treatment including education by Diabetic Nurse Educators, dieticians, biokineticists and pharmacists.
- The cost of diabetes to society must also be considered and must include not just the health related costs but also the cost of lost work hours due to illness, the cost of early retirement due to complications, the welfare costs for the disabled and their dependents.
- The patient is the most important member of the treatment team and must be empowered to fulfil this role.

What is clear is that our current treatment strategies from a society point of view are failing and that perhaps we need to make a fresh stage being cognisant of the points raised above.

An effective treatment regime needs to fulfil the following criteria:
- Be simple enough for patients and all members of the health care team to be able to follow.
- The criteria for initiating treatment must be simple and clear.
- The criteria for changing or escalating treatment must be clear and simple.
- Monitoring must be done at regular intervals and the factors that need to be monitored and their targets must be clear and simple.
- Education given to patients must be evidence based and must be consistent from all members of the health care team.
- Pharmacological treatments must be chosen for effectiveness, ease of use and low side-effect profiles.

If we are serious about addressing the diabetes epidemic we are going to need a strategy which is much more like the ones that have been effectively rolled out to treat HIV. This involves training diabetic nurse educators to play a much more active role in the treatment. They should have immediate access to monitoring equipment needed to assess control. They should be empowered to make changes to pharmacological treatments and should also have easy and direct access to endocrinologists or Physicians with a special interest and training in Diabetes to help with more difficult decisions and treatments.

We are also going to have to reconsider our choice of pharmacological treatments. Some of the newer drugs such as the DPP4 inhibitors and the GLP1 analogues may need to be moved up the treatment protocol in view of their ease of use and relative safety especially when hypoglycaemia is a concern. These agents will be much more acceptable to patients and will be safer for diabetic nurse educators to initiate especially in resource poor areas. The cost of the agents can be negotiated down through bulk buying and will be offset by the benefits to society as a whole from having better controlled diabetics who can continue to function as active productive members of society.

Patients need to be empowered through education but especially through the ability to be able to monitor their own progress at home. This is however only cost effective if they are empowered to make changes or to contact their health care providers to make changes based on this monitoring. This can only be done through frequent personalised education and encouragement which can again only be delivered cost effectively by the more widespread use of diabetic nurse educators.

Finally the system needs to be monitored and audited so that problems areas can be quickly identified and changes implemented.
Case study:
Mr Jacques van Zyl and his wife, Ronel visited our dietetic practice (Diet Pro) in May, 2010. He had a serious obesity problem, so much so that the electronic scale could not measure his weight or fat percentage and he had to be weighed on a manual bathroom scale. As is often the case, he also suffered from high blood pressure, high cholesterol and type 2 diabetes with high blood glucose. His GP prescribed Cipalat Retard, 20mg (one per day), Cipla-Perindopril, 8mg (one per day), Adco Dapamax, 2.5mg (one per day) and Glucophage, 500mg (two per day) to control these conditions, and referred him to our private practice for dietary counselling and lifestyle changes, as diet and lifestyle were clearly the root causes of most of his health problems.

His vital statistics were as follows:
• Weight: 145kg (BMI=46)
• Body fat percentage could not be determined, but by extrapolation from his fat percentage and weight in the second consultation, this must have been about 55%, pushing his total body fat to an initial high of about 80kg.
• Blood pressure: raised, so much so that he required more than one medication to control it.
• Abnormal lipogram, with a total cholesterol of 5.1 (2.8-4.9) mmol/l, LDL-cholesterol of 3.3 (1.6-2.9) mmol/l, triglycerides of 1.9 (0.5-1.6) mmol/l and HDL-cholesterol that was too low at 0.8 (1.0-1.6) mmol/l.
• Type 2 diabetes with a high blood glucose of 9.9 (3.9-6.0) mmol/l.

Upon deeper investigation into his eating habits, the following was discovered:
• Mr Van Zyl rarely ate breakfast and when he did have breakfast, it consisted of high-GI cereal or low-GI bread with high-GI syrup and too little low-fat protein.
• Furthermore, he rarely ate lunch, with the result that by the time he returned home at 17.00, he was starving. It wasn’t surprising that he raided the fridge and pantry. Typical snacks would be crisps, biscuits, dried wors and biltong, cheese, vienna sausages and leftover food.
• He did not have any snacks between the odd meals, but drank about two litres of cola drinks per day. Together with this, they also consumed high GI and/or alcoholic drinks like soft drinks, sports drinks, beer, spirit coolers, etc.
• The fact that he skipped lunch invariably caused him to consume 2 plates of food for supper (in spite of consuming all the snacks at 17h00) and sometimes he even woke up hungry during the night, only to consume more food.
• Mr and Mrs Van Zyl loved take aways, which they often ate for supper.
• They also did not eat much fruit and vegetables or salad, which are some of the main causes of lifestyle diseases.
• On top of this, Mr Van Zyl did no exercise, but promised to start using a treadmill at their home.

Treatment
After assessing their dietary habits and lifestyle, they were asked to adjust their lives to include the following:
• Daily light-to-medium-intensity exercise. Mr Van Zyl undertook to walk on the treadmill for 20 minutes in the morning and 20 minutes in the evening.
Refraining from drinking regular soft drinks and limiting alcohol consumption, although he said that he seldom consumed alcohol in excess. Water and low-kilojoule drinks would be preferred in future, as well as decaffeinated coffee and rooibos tea with low-fat or fat-free milk and sweetener. A limited volume of regular coffee and tea was allowed.

A low-fat, low-GI, low-sodium, high-fibre diet was prescribed and explained to both Mr and Mrs Van Zyl, which included an explanation of the condition, a shopping list with foods that were best to avoid and a daily meal plan with recommended portions.

A balanced low-fat, low-GI breakfast containing enough low-fat protein/dairy and a little good fat was prescribed, as well as a balanced low-fat, low-GI lunch with low-GI starch, a little low-fat protein and a little good fat and plenty of free vegetables or salad or vegetable soup.

Low-GI fruit was prescribed as snacks, and after exercise an intermediate-GI fruit allowed.

Mrs Van Zyl took on the responsibility of cooking dinner, mainly from the ‘Eating for sustained energy’ recipe book(s), which meant that she had direct control over the food that they were eating.

Follow up:
Mr Van Zyl is coming for monthly follow up sessions. After only one month his weight had dropped to 137.8kg and his fat percentage (which could then be measured, as the electronic scale could weigh him) was 53%. He was eating a balanced low-fat, low-GI breakfast (as prescribed) and fruit (mostly low-GI) for snacks, daily. For supper, Mrs Van Zyl cooked low-fat, low-GI, portion-controlled meals from ‘Eating for sustained energy’ (1) with half a plate of vegetables or salad and for lunch Mr Van Zyl ate half a supper portion, with plenty of salad.

They eat plenty more fruit and vegetables/salad/vegetable soups than before and have come to love these. Not eating enough fruit and vegetables is the problem of most overweight people. When they get people over to watch sport on TV, they provide low-fat, low-GI snacks with plenty of low-GI carb sources, low-fat protein options and vegetable crudites with a low fat dip and they cut out one meal that day. Mr Van Zyl also still walks 20 min on the treadmill every morning and every evening, although he can do many more km now than initially and is even considering partaking in a fun walk or run. He has learnt to ‘listen to his body’ when it comes to being hungry during the day, when he takes regular meals and snacks, instead of drinking soft drinks all day, which used to mask his hunger.

Because he eats regular meals, he is able to eat only a low-GI fruit before he gets onto the treadmill at 17.00 and an intermediate-GI fruit after his treadmill walk, which helps to prevent a drop in blood glucose before the next meal. He is then also able to eat only one plate of food for supper and never gets up at night to eat anymore, like he and his wife used to do before. He feels wonderful, healthy and full of energy and says it wasn’t even difficult. He says he can follow this way of eating and lifestyle for the rest of his life and won’t feel deprived.

Follow up:  
Mr Van Zyl is coming for monthly follow up sessions. After only one month his weight had dropped to 137.8kg and his fat percentage (which could then be measured, as the electronic scale could weigh him) was 53%. He was eating a balanced low-fat, low-GI breakfast (as prescribed) and fruit (mostly low-GI) for snacks, daily. For supper, Mrs Van Zyl cooked low-fat, low-GI, portion-controlled meals from ‘Eating for sustained energy’ (1) with half a plate of vegetables or salad and for lunch Mr Van Zyl ate half a supper portion, with plenty of salad.

After eight months the results are still dramatic:
- Weight loss: from 145kg to 105 kg; Fat % from 53% (second consultation) to 31% (January 2011). His total body fat is down from about 80kg to 32.6kg. His lean body mass increased by 7.4kg.
- Blood pressure: In September 2010 his doctor halved his Cipla-Perindopril to 4mg per day and discontinued his Adco Dapamax, in November 2010 his doctor halved his Cipla-Perindopril further to 2mg per day and discontinued his Cipalat Retard until he is now taking no medication anymore since January 2011 and his blood pressure is normal every time it is checked.
- Current lipogram: total cholesterol of 3.4 (2.8-4.9) mmol/l, LdL-cholesterol of 1.9 (1.6-2.9) mmol/l, triglycerides of 1.6 (0.5-1.6) mmol/l and HDL-cholesterol higher at 0.8 mol/l.
- The use of Glucophage was also discontinued by his GP in January 2011, as his blood glucose is 5.7mmol/l now and his average blood glucose (calculated) 6.5 (3.8- 7) mmol/l.

Comments
The Van Zyl family responded very favourably to diet therapy. It was to their advantage that they weren't emotional eaters. They had bad dietary and lifestyle habits that could easily be changed. Their poor diet was mainly due to ignorance. Basic dietary knowledge about low-GI, low-fat eating educated them to such an extent that they will possibly do fine by seeing the dietician for a follow up visit every six months and could possibly be without any medication for life, if they stick to this lifestyle.
Calcium supplementation, myocardial infarction and cardiovascular events

Abstract
In a meta-analysis, calcium supplementation above 805mg/day, average dose 1200mg/day with some trials up to 2g/day was associated with a hazard value of 1.31 and 1.27 (statistically this is a weak association). This weak association was statistically significant by 95% confidence interval.

These findings were consistent with trials of patients with renal failure in which calcium supplements were associated with no increase in mortality.

The trial excluded the use of vitamin D. No osteoporosis management would be appropriate in the absence of vitamin D.

The benefits of various osteoporosis treatments - bisphosphonates as well as sevelamer and vitamin K, particularly in deficiency states have not been studied.

Well-designed intervention trials including cardiovascular calcification screening and bone mineral density are required.

The target population of these trials may be critical.

Introduction
In a 2010 meta-analysis, it was suggested that calcium supplements (without coadministered vitamin D) are associated with an increased risk of myocardial infarction. As calcium supplements are widely used, these modest increases in risk of cardiovascular disease might translate into a large burden of disease in the population. A reassessment of the role of calcium supplements in the management of osteoporosis is warranted.

The Auckland study suggested that calcium supplementation may accelerate vascular disease, particularly myocardial infarction.

Trials and studies
A 2010 meta-analysis using 2500mg calcium per day without vitamin D in five studies contributing patient level data (8151 participants for average follow-up of 3.6 years) showed a hazard ration for myocardial infarction of 1.31 (statistically this is a weak association) (95% confidence interval [CI] 1.02-1.67), while the HR for stroke and sudden death was not statistically significant by 95% CI. The HR for MI for total level data (11 studies, 11 921 participants for average 4.0 years) was 1.27 (95% CI 1.01 to 1.59).

In 2008, the Auckland study suggested that calcium supplementation may accelerate vascular disease, particularly myocardial infarction, in elderly women (mean age 74 years) and renal impairment even prior to dialysis commencement. The primary outcome was the effect of elemental calcium citrate on bone density and fracture outcome. The study has not statically assessed the relative risk in the elderly or in women with renal impairment only, and has not done arterial calcification assessments.

Three of the largest calcium supplementation studies make no mention of vascular events, four studies showed reduction with calcium supplementation, the Lappe study showed no increased vascular risk, the Record study showed a high death rate only, and a study in 75-year-old women had a relative risk (RR) of ischemic heart disease of 1.12 and a 95% confidence interval (95% CI) of 0.7-1.64, in which the trend is in the same direction as the Auckland Study. Although Reid and Bolland suggest that the Auckland Study results are not incompatible with the Women's Health Initiative, Hsia's conclusion is that calcium/vitamin D supplementation neither increased nor decreased coronary or cerebrovascular disease.

Calcium supplementation increases the ratio of high density lipoprotein (HDL) cholesterol to low density lipoprotein (LDL) cholesterol by almost 20% in postmenopausal women, causes small and transient blood pressure reduction, and there is inconsistent evidence that it causes weight loss.
Vascular calcification

Vascular calcification can be divided aetiologically, anatomically and histologically into four groups.

• **Intimal arterial calcification** is atherosclerotic dependent, and microscopically shows intimal thickening and plaque formation associated with inflammation and macrophage infiltration. Cartilage metaplasia and endochondral bone formation occurs.

• **Tunica media arterial calcification or Mönckeberg's sclerosis** (MS) is atherosclerosis independent and associated with ageing, especially with renal disease, haemodialysis, and diabetes, as well as vitamin K (VK) deficiency due to the above, dietary deficiency, inflammatory bowel disease, the ApoE4 genotype, and oral anticoagulants. The calcification starts around the elastin fibres without inflammation and initially with no neo-intimal extension. The mineralisation resembles intramembranous bone without cartilage formation. These changes are similar to changes in transgenic matrix glutamic acid protein (MGP) deficient rats and warfarin treated mice. A recent study suggests that MS can involve the internal elastic lamina.

• **Cardiac valve calcification**

• **Vascular calciphylaxis** occurs when serum calcium-phosphate levels increase and the physiological solubility level is exceeded, and causes widespread soft tissue calcification. This occurs with end-stage renal disease, acute renal insufficiency with muscle injury and tumor lysis.

**Biological evidence of vascular calcification inhibition**

Matrix glutamic acid protein (MGP) is one of the inhibitors of the crystal formation of calcium and phosphate. The formation of MGP depends on the carboxylation of glutamate residues (Glu) to gamma-carboxyglutamate (Gla). Most of the MGP is synthesized in the arterial vessel by medial vascular smooth muscle cells. In both intima and media, the presence of carboxylase and reductase enzymes in vascular endothelium, fibroblasts, and smooth muscle cells demonstrates capability to produce Gla proteins. MGP is a VK-dependent protein, the expression of which is vitamin D dependent, and in animal studies regulates chondrocytic mineralization and is a potent soft tissue calcification inhibitor.

Decreased carboxylation due to low VK levels results in abnormal functions of inactive ucMGP, and arterial medical calcification or Mönckeberg's Sclerosis occurs with the formation of undercarboxylated osteocalcin (UC OC), and its action on hydroxyapatite causes osteoporosis and the "calcification paradox.

Medial arterial calcification also occurs in diabetics. MGP is involved in maintaining vascular elasticity and may be deficient due to dietary deficiency, absorption problems or impaired metabolism. ucOC is slightly elevated in the early post menopause but increases rapidly after 70 years due to VK deficiency (VK antagonists e.g. warfarin deplete VK by interfering with VK absorption via the recycling of VK exoside to VK quinone and are associated with VK deficiency and MS).

**Animal studies**

MGP deficient ‘knock-out’ mice and VK antagonist warfarin treated rats develop vascular mineralization and rupture of blood vessel. This suggests that Gla residues are essential to calcification inhibition. The mice’s arterial calcification starts in the media, resembles MS and does not develop atherosclerosis.

**Clinical studies**

The ‘calcification paradox’ of increased arterial calcification, reduced bone mineral density and increased ucOC has been demonstrated and is associated with long-term VK deficiency.

VK2 in a population based study reduced aortic calcification, ischemic heart disease and cardiovascular mortality. This suggests VK2 may be a more effective arterial calcification inhibitor than K1 although the difference may be due to pharmacokinetics and tissue distribution.

In a cohort study of postmenopausal women without aortic calcification the VK intake was 42.9ug more than in women with calcification.

In a three-year randomized placebo controlled study in postmenopausal women, 1mg VK1, 8ug vitamin D3, 500mg calcium, 10mg zinc and 150mg magnesium supplementation protected against vascular hardening and loss of arterial elasticity whereas the placebo group and group without VK1 (including vitamin D) did not have this benefit. No differences were noted in the three groups in intima-media thickness. Limitations of the study were that brachial pulse pressure and not carotid pulse pressure was measured and the study had a high drop-out rate.

*In a cohort study of postmenopausal women without aortic calcification, the VK intake was 42.9ug more than in women with calcification*
Studies suggest a correlation between arterial stiffness and myocardial infarction and coronary artery disease and the calcification score and arterial stiffness in end-stage renal disease patients. Braam put forward a hypothesis that local VK deficiency is a risk factor for vascular hardening, increased stiffness and loss of elastic properties. VK2 (MK4) in high dose has cholesterol lowering properties.

**Vitamin K treatment for cardiovascular health**

200-500ug/day of dietary VK is possibly required for cardiovascular health, although the dose may be as low as 100ug/day. VK may act synergistically with vitamin D, calcium and rather micronutrients for cardiac health.

**Treatment of vascular calcification**

Negri, in an article on treatment of vascular calcification in chronic renal disease, makes several suggestions. Unlike the calcium-based phosphate binders, sevelamer, a non-calcium phosphate binder reduces serum phosphorus and parathyroid hormone without increasing serum calcium and its potential to increase vascular calcification. In animal experiments, ibidronate completely inhibited arterial calcification, intravenous pamidronate in chronic renal disease improved calciphylaxis, etidronate reduced the progression of coronary artery calcification in haemodialysis patients and alendronate inhibited arterial calcification.

**Conclusion**

The conclusion of the meta-analysis was that randomized studies suggest that calcium supplements without coadministered vitamin D are associated with an increased incidence of myocardial infarction. The vascular effects of calcium supplements especially without vitamin D, should be studied further.

This applies to patients on high-dose calcium (2500mg/day) (meta-analysis abstract) with an increased risk of myocardial infarction above the median of 805mg/day (meta-analysis results) without coadministered vitamin D, particularly in elderly women (mean age 74 years) and renal impairment, even prior to dialysis commencement. Vitamin K may also be beneficial to cardiovascular health.

Would prevention of under-carboxylation of MGP by vitamin K supplementation prevent arterial calcification (Mönckeberg’s Sclerosis) and the increased cardiovascular events that are suggested by the Auckland trial?

A supplement containing VK1 and D appears to have a beneficial effect on the elastic properties of the arterial vessel wall. VK1 and VK2 may be effective for the prevention and treatment of osteoporosis and arterial calcification – the “calcification paradox.” Final proof of the importance of VK must come from well-designed intervention trials. Clinical trials measuring progression of calcification are needed to provide further evidence that VK contributes to the prevention of cardiovascular disease.

The target population in these trials may be critical.

*References available on request*
With healthcare reform in SA at a critical juncture, the theme of the 2011 Hospital Association of South Africa’s (HASA) annual conference has been aptly titled ‘Reform Side by Side.’

The conference will be held at the Cape Town International Convention Centre from 21–22 September.

“HASA is revamping the format of its annual conference and this year’s event promises to offer up a world-class, engaging, informative and professional experience,” says HASA chairman, Dr Nkaki Matlala.

The content of the 2011 event will encourage delegates and stakeholders in the healthcare industry to rethink, reconnect and reform the healthcare system in such a way that it can deliver quality, affordable healthcare to South Africans on a sustained basis.

“A system only functions when it’s connected. It’s clear that the public and private sector need to work side by side in order to accomplish viable reform,” says Matlala.

With the expansion of healthcare coverage a major instrument in government’s healthcare reform plans, topics covered at the conference will include the private sector’s role in optimising universal access to quality healthcare in a resource constrained environment and funding strategies to finance broad-based healthcare reforms. Alternative funding strategies that could be implemented to produce more inclusive, efficient and equitable healthcare provision will also be explored.

Successful case studies of countries that have managed to increase the number of healthcare professionals will be showcased, while health economists will look into the potential impact of an additional tax on the medical scheme population. Implementing quality measurement and improvement programmes will also be on the agenda.

A number of renowned local and international experts will address conference delegates. These individuals will share their experiences on transforming and developing sustainable healthcare systems. Speakers include:

• Dr Michael Thiede, Senior Health Economist at the University Hospital Heidelberg
• Pedro Delgado, Executive Director for the Institute of Healthcare Improvement
• Dr Ramon Castano-Yepes, MD, PhD, Colombia
• Dr Mark Britnell, Chairman & Partner, Global Health Practice, KPMG
• Heather McLeod, ENZCAM, University of Canterbury, New Zealand
• Andrew Donaldson, Deputy Director General Public Finance, National Treasury
• Prof Hoosen Coovadia, Emeritus Victor Daitz Professor of HIV/AIDS Research; Emeritus Professor of Paediatrics and Child Health, University of Natal; Director at Match, University of the Witwatersrand
• Jessica Long, Accenture Development Partners
• Dr Okore Okorafor, Health Economist, Medi-Clinic Southern Africa
• Dr Jonathan Broomberg, CEO Discovery Health
• Dr Brigid Strachan, Consultant Health Care Policy and Financing, Impact Health Management Solutions
• Prof Alex van den Heever, Old Mutual Chair of Social Security Systems Administration and Management Studies, University of the Witwatersrand
• Carla Faustino Coelho, International Finance Corporation Advisory Services in Public Private Partnerships
• Prof Alex van den Heever, Old Mutual Chair of Social Security Systems Administration and Management Studies, University of the Witwatersrand

The Minister of Health, Dr Aaron Motsoaledi, will also address conference delegates on the morning of Thursday, 22 September.

“We’re looking for practical, pragmatic ways to improve SA’s healthcare delivery and the conference will present an opportunity to explore ways of working together with government and coming up with new solutions,” says Matlala.

“We hope to bring fresh perspectives to the debate about universal access. It’s only through new thinking that we’ll be able to come up with new ways of doing things,” he says.
Nutrition is an important factor in the aetiology and management of several diseases and thus it is important to ensure optimum nutrition in all circumstances.

Optimum nutrition is critical for the well-being of our society, especially the children. The variety, quantity, cost and accessibility of food and patterns of food consumption can affect health, and thus growth and development in children. Studies done in Europe shows that 19-24% of all children admitted to hospitals is already malnourish. Malnutrition is defined as the excess, imbalance or deficiency of any nutrient (protein, carbohydrates, fats, vitamins and minerals) that have an adverse effect on body size and composition and thus on growth, development and recovery. Malnourished paediatric patients have significantly higher rate of infectious complications and significantly longer duration of hospitalization. Undernutrition develops when there is inadequate nutrient intake for the specific requirements. Nutritional deficiencies can be caused by inadequate ingestion, impaired absorption and digestion or increased excretion of essential nutrients. Infants and children are at great risk for becoming malnourish. Malnutrition in itself can lead to impaired growth and development, suppressed immunity as well as poor wound healing. This can increase the mortality and morbidity. Overnutrition has its own risks and side effects. Obesity, diabetes, heart disease etc. are all related to over nutrition, and may have a poor clinical outcome with increased morbidity and mortality.

Nutritional status is influenced by both nutritional intake and nutritional requirements. A person’s nutritional status reflects the degree to which physiological needs for nutrients are met. Nutritional intake can be influenced by economic situations, eating behaviour i.e. fussy eater etc., emotional climate, culture, effects of various diseases on appetite and also the ability to consume and absorb adequate nutrients. Nutritional requirements are also influences by factors such as age, gender, the presence of disease, infections, fever, the normal anabolic state of growth and many more. It is thus important to consume adequate amounts of all nutrients, macro- and micro-nutrients, to support the daily needs and any other additional requirements to ensure optimal nutritional status. Optimum nutritional status ensures growth and development, maintains general health and protects the body from illness and disease.

Appropriate assessment can detect nutrient deficiencies early and this can lead to early intervention which can improve nutritional intake/status through nutritional intervention and education/counseling, before more severe conditions develops. The assessment of healthy individuals would be different from those who are critically ill. Nutrition screening of patients should be done routinely to prevent any malnutrition. The goals of nutrition assessment are to (1) identify individuals who require aggressive nutritional support, (2) restore or maintain an individual nutrient status, (3) identify appropriate medical nutrition therapies and (4) monitor the efficacy of these interventions. Once a nutritional assessment is completed, the extent of nutritional adequacy, deficiency or excess is clear. A nutritional care plan can then be drawn up and implemented to assist in the improvement of the nutritional status. Regular reassessment is very important to ensure improved nutritional status and to make necessary changes when needed to achieve to the nutrition goals.
The goal of nutritional screening is to identify: 1) those at risk of malnutrition, 2) those who are likely to become at risk for malnutrition and 3) those who need further assessment. Nutritional screening is done using a screening tool, during which one obtain information such as height, actual bodyweight, recent weight loss or increase in weight any special diets and diagnosis.

There are common and specific problems one faces and we need to address both in order to achieve the goal of optimum nutrition. These are:

1. **Lack of clearly defined responsibilities in the planning and management of nutritional care.**
   The responsibilities of staff categories and the hospital management with respect to procuring nutritional care should be clearly assigned. This means that standards of practice for assessing and monitoring nutritional risk/status of the patient should be developed at a national level, and the responsibility of each task clearly assigned.

2. **Lack of sufficient education with regard to nutrition among all staff groups.**
   A general improvement in the educational level of all staff groups is important. A continuing education program on general nutrition and techniques of nutritional support for all staff involved in the nutritional care of patients should be available with focus on the nutritional training of the non-clinical staff members, and defining their area of responsibility.

3. **Lack of influence and knowledge of the patients.**
   The provision of meals should be individualized and be flexible. All patients should be given the option to order food and order extras if necessary, as well as be informed about this possibility. Patients should be informed about the importance of good nutrition for successful treatment prior to admission (if possible) and at discharge.

4. **Lack of co-operation between different staff groups.**
   The hospital managers, physicians, nurses, dieticians and food service staff should work together toward the common goal: Optimal nutritional patient care and the hospital management should give priority to co-operation.

Examples of easy screening tools are STRONGKids (Screening Tool for Risk Of impaired Nutritional status and Growth) and STAMP (Screening Tool for the Assessment of Malnutrition in Paediatrics).

**STRONGKids (Screening Tool for Risk Of impaired Nutritional status and Growth)**

**Screening for risk of malnutrition:**

<table>
<thead>
<tr>
<th>Once a week in children aged 1 month – 18 years</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Is the patient in a poor nutritional status judged with subjective clinical assessment (diminished subcutaneous fat and/or muscle mass and/or hollow face)?</td>
<td>No = 0</td>
</tr>
<tr>
<td>2) Is there weight loss or no weight gain (infants &lt; 1 year) during the last weeks-months?</td>
<td>No = 0</td>
</tr>
<tr>
<td>3) Is one of the following items present?</td>
<td>No = 0</td>
</tr>
<tr>
<td>- Excessive diarrhoea (&gt;5 /day) and/ or vomiting (&gt;3 /day)</td>
<td></td>
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<tr>
<td>- Reduced food intake during the last few days</td>
<td></td>
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<tr>
<td>- Pre-existing nutritional intervention</td>
<td></td>
</tr>
<tr>
<td>- Inadequate nutritional intake due to pain</td>
<td></td>
</tr>
<tr>
<td>4) Is there an underlying illness with risk for malnutrition (see list) or expected major surgery?</td>
<td>No = 0</td>
</tr>
</tbody>
</table>
### Risk of malnutrition and need for intervention

<table>
<thead>
<tr>
<th>Score</th>
<th>Risk</th>
<th>Intervention and follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-5 points</td>
<td>High risk</td>
<td>Consult doctor and dietician for full diagnosis and individual nutritional advice and follow-up. Consider prescribing supplements whilst awaiting confirmation of status.</td>
</tr>
<tr>
<td>1-3 points</td>
<td>Medium risk</td>
<td>Consider nutritional intervention. Check weight twice per week and evaluate the nutritional risk weekly. If necessary consult specialist/doctor for full diagnosis.</td>
</tr>
<tr>
<td>0 points</td>
<td>Low risk</td>
<td>No nutritional intervention necessary. Check weight regularly and evaluate the nutritional risk weekly (or according to hospital policy).</td>
</tr>
</tbody>
</table>

### STAMP (Screening Tool for the Assessment of Malnutrition in Paediatrics)

<table>
<thead>
<tr>
<th>Steps</th>
<th>Score</th>
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</thead>
<tbody>
<tr>
<td>1. Diagnosis</td>
<td>Definitely = 3, Possibly = 2, No = 0</td>
</tr>
<tr>
<td>2. Nutritional intake</td>
<td>None = 3, poor = 2, No change/good = 0</td>
</tr>
<tr>
<td>3. Weight and height</td>
<td>&gt; 3 centile spaces/ ≥ 3 columns apart (or weight &lt; 2nd centile) = 3</td>
</tr>
<tr>
<td></td>
<td>&gt; 2 centile spaces/ columns apart = 1</td>
</tr>
<tr>
<td></td>
<td>0 to 1 centile spaces/ columns apart = 0</td>
</tr>
<tr>
<td>4. Overall risk of malnutrition</td>
<td>High risk ≥ 4</td>
</tr>
<tr>
<td></td>
<td>Medium risk 2–3</td>
</tr>
<tr>
<td></td>
<td>Low risk 0–1</td>
</tr>
<tr>
<td>5. Care plan</td>
<td>Develop a care plan based on the child’s overall risk of malnutrition</td>
</tr>
</tbody>
</table>

**High risk:**
- Take action
- Refer to a Dietitian
- Monitor as per care plan

**Medium risk**
- Monitor nutritional intake for 3 days
- Repeat STAMP screening after 3 days
- Amend care plan as required

**Low risk**
- Continue routine clinical care
- Repeat STAMP screening weekly while child is an in-patient
- Amend care plan as required

*Nutritional screening is done using a screening tool, during which one obtains information such as height, actual bodyweight, recent weight loss or increase in weight, any special diets and diagnosis.*
Nutrition screening and assessment for optimum nutrition

References:
5. NICUS – Fact Sheet – Hospital Malnutrition – European Union moves to address the “skeletons in the hospital cupboards”.

It is estimated that; 80% of cases of coronary heart disease, 70% of strokes, 90% of type 2 diabetes cases and one third of cancers can be avoided by changing to a healthier diet, increasing physical activity and stopping smoking.

(WHO, 2006; Willet, 2006)
Key challenges to the South African healthcare system

The South African health care system is currently facing a significant challenge related to service delivery. With less than 20% of the population in a position to afford and have access to private health care insurance, the need and demand for services at public health care facilities is significant.

Although the budget allocation has increased from around R63 billion for the 2007/08 allocation year to R102.5 billion for 2010/11 period, the system is still characterized by a fragmented and curative orientated approach to service delivery. Paradoxically, with an increase in resources the resulting health indicators have deteriorated. However, it will only be fair to indicate that the increase in resource allocation also made provision for measures to address maternal and child mortality rates, HIV/AIDS treatment and the improvement of health facilities.

The key challenges remains four-fold, namely:
• HIV/AIDS, and tuberculosis
• increasing maternal and child mortality rates
• violence in society, and
• the challenges to health status posed by non communicable diseases, including but not exclusive to diseases of lifestyle, cancers, diabetes and respiratory tract infections.

South Africa has 5.7 million people infected with HIV/AIDS, and although we only constitute 0.7% of the world population, the 5.7 million represent 17% of the world infections. Furthermore, we also proportionally have the highest number of tuberculosis cases, with an increase in the number drug resistant and extreme drug resistant cases.

An alarming fact is that there have been increases in both the maternal and child mortality rates, with especially maternal mortality rates on a steep increase. To achieve the Millennium Developmental Goal target for these two indicators, the infant mortality rates will have to decrease by at last two thirds with the maternal mortality rates requiring a decrease of three quarters. Whether this is achievable by 2015 is highly questionable.

Violence in South Africa continues to be a major contributor to mortality rates and remains high in the top 10 causes for death in South Africa.

Non-communicable diseases will most likely be one of the greatest challenges facing the health care sector, and the importance attached to this problem is highlighted in that the United Nations will have a special seating during September 2011 to discuss action and interventions. The increase in youth-onset diabetes, incorrect diagnosis of diabetes at an appropriate stage, increase in cardiovascular diseases resulting from lifestyle and other non-communicable diseases will place severe further strain on an already stressed health care system.

It is the belief of the University of Johannesburg that to address the abovementioned challenges, training institutions will have to change their approach in respect of the teaching of health care professionals. These challenges require, inter alia, specific skills and competencies at various levels and in different domains. It is believed that if training can occur in an integrated manner with a range of practitioners, health outcomes can be addressed in a more holistic manner.

These practitioners include, but are not exclusive to;
• medicine and allied health practitioners;
• nursing staff.
An aspect that requires serious consideration is the possible role of complementary health practitioners. Currently these domains do not have access to public health care facilities and in a country where there is a severe shortage of medical practitioners (0.56/1000 capita compared with Brazil and Mexico who have 1.85 doctors and 1.90 doctors per 1000 capita respectively) the value add of these domains should be considered and could add significant value to a system that is understaffed and under resourced.

A further consideration is to accelerate the implementation of mid-level health care workers, optimising skills and resources at appropriate levels. Broadening the base of clinical associated at this level, especially for rural areas, should also be prioritised.

With the training and expansion of health care workers, the following matters, although not exhaustive or exclusive, should receive additional attention:

- Improvement in clinical skills and adherence to minimum proficiency levels;
- better multi-disciplinary understanding and implementation;
- appropriate skills set for clinic and hospital (at all levels) managers; and
- Understanding, exposure to and availability of relevant technology.

To achieve success in the matters indicated, one of the approaches will have to be a better integration between public and private institutions. One of these approaches is the agreement between Philips Healthcare and the Faculty of Health Sciences, University of Johannesburg. The memorandum is to establish a mutually agreeable framework to cooperatively address the healthcare skills shortage in South Africa. The University of Johannesburg and Philips share a joint mission to educate, train and prepare students to work as healthcare professionals in the challenging healthcare environment of the country. As a leading company in health and well-being, Philips aims to improve the quality of healthcare in South Africa through meaningful solutions, innovations and partnerships.

The collaboration between the University of Johannesburg and Philips was announced at the Johannesburg leg of Philips’ Cape Town to Cairo road show; during which Philips travelled across Africa (from 12 May to 11 July 2011) to raise awareness about how relevant healthcare and lighting solutions can improve the quality of life across the continent.
Many South Africans are in desperate need of help with their substance abuse habit or that of a loved one who is often unwilling to admit the problem exists. Most people looking for rehabilitation facilities cannot afford private rates and instead rely on state institutions, which are stretched to their limits with long waiting lists. Of those battling substance abuse, many are also dealing with a mental illness such as depression, anxiety, schizophrenia, bipolar disorder, attention deficit hyperactivity disorder (ADHD), panic disorder, obsessive-compulsive disorder or post-traumatic stress disorder (PTSD). A major challenge facing South Africa is the severe shortage of both substance abuse centres and mental healthcare facilities in the country.

In a misguided attempt to treat the symptoms of their mental illness or the side-effects of their medication, some patients turn to drugs. Because of stigma, fear and embarrassment, and a need to control how they are feeling, these people self-medicate to reduce their levels of anxiety or depression – at least for a while. Alcohol, marijuana and cocaine, as well as prescription drugs like tranquillisers and sleeping pills, are all commonly abused.

**Drugs like marijuana, ecstasy and LSD can actually cause mental illness**

However, drugs like marijuana, ecstasy and LSD can actually cause mental illness. Drug abuse by teens is particularly concerning, as it not only has physical implications, but it can also interfere with how teens socialise and relate to their peers, as well as contribute to the development of mental disorders. Adolescents feel pressured to take drugs or drink alcohol, but if that adolescent is depressed, the effects can be tragic. “Alcohol and many drugs are depressants and change the way our brains work,” says Dr Michael Niss, expert Johannesburg psychologist. “Paradoxically, people drink or take drugs to help them escape their isolation, shyness or depression, but with increased use their depression gets worse and their shyness and isolation increase.”
Addicts are also at heightened risk of suicide. In South Africa, alcohol is a major factor in one-third of suicides. “Alcohol not only makes you more morose, but it also reduces your inhibitions and increases the likelihood of you doing something out of character and reckless,” says Professor Alonso-Betancourt from the Eastern Cape. Both families and mental health professionals appear to underestimate the extent of drug use and dependency of the people in their care. People with mental illnesses may abuse drugs without their families knowing and it is often difficult to separate the symptoms of mental illness from those of substance abuse. This means the families of those with a dual-diagnosis of a mental illness and a substance abuse disorder really battle to find appropriate help, care and understanding for themselves and their loved ones. Currently, South Africa has relatively little to offer in the way of treatment for patients with a dual-diagnosis, who are bounced back and forth between services for mental illness and those for substance abuse, and may be refused treatment by each of them. “Getting people help is a big problem,” says Cassey Chambers, the Operations Director of the South African Depression and Anxiety Group (SADAG). “We have a toll-free substance abuse line – 0800 12 13 14 – because many people don’t know where to go or who to talk to. SADAG offers callers hope, advice, information, referrals and support.” Substance abuse complicates almost every aspect of care for the person with a mental illness. They are often difficult to get into treatment, diagnosis is challenging, they experience social and relationship problems due to the substance use, and they may not be tolerated in rehabilitation programmes. With an added substance abuse diagnosis, patients often suffer frequent relapses and hospitalisations. Families of dual-diagnosis patients need all the help they can get to help them cope. Chambers points out that we need to educate people not only on the dangers of drugs and alcohol, but also on the reasons people turn to these substances for comfort.

**UCT Department of Medicine Physicians Conference**

**Thursday 23 – Sunday 26 February 2012**

**Cape Town International Convention Centre**

The programme will focus on ‘Optimising standard management of Common Medical Conditions’

The topics will be relevant to specialist physicians and trainees, in the private and public sectors, and colleagues beyond our borders

**Satellite Symposia:** Thursday 23 February, at Groote Schuur Hospital.

The format of the conference will include seminars, interactive sessions, quizzes and updates.

**Topics** will include the fields of Allergology and Clinical Immunology, Cardiology, Dermatology, Diabetes and Endocrinology, Emergency Medicine, Gastroenterology, Geriatrics, Haematology, Hepatology Infectious Diseases and HIV Medicine, Lipidology, Medical Ethics, Nephrology, Neurology, Pharmacotherapy, Pulmonology, and Rheumatology.
Imaging technology plays a vital role in women’s wellness in South Africa, a key priority for a group of specialised healthcare companies supplying the local market. Members of the Medical Imaging Systems Association (MISA), meet regularly to discuss the challenges and successes around the use and application of rapidly evolving imaging technology.

The technology and its various products not only help prevent disease through early and more accurate detection, but healthcare costs are also significantly reduced as a result thereof. In South Africa, where the public healthcare burden is already high, this has significantly improved life expectancy.

Established in 2004, MISA also aims to best serve the needs of the local healthcare market for the best patient outcomes. Tanya Vogt, MISA spokesperson, maintains that medical imaging is changing how doctors diagnose and treat a broad spectrum of female-specific conditions.

"From cancer to heart disease, imaging offers a valuable tool for healthcare professionals’ diagnosis and treatment plans. Also, as swift innovation further improves this technology, women’s wellness has experienced benefits from the advances."

Imaging is widely used for many health conditions affecting women. With heart disease one of the leading causes of death in women, cardiovascular imaging complements stress tests to accurately diagnose life-threatening conditions.

Bone density testing - vital for osteoporosis screening and care - is another important intervention, particularly since 80% percent of osteoporosis patients are women.

Imaging technology is also used for mammography and breast biopsy, breast magnetic resonance imaging, radiation treatment for early-stage breast cancer, cervical cancer screening, treatment for menorrhagia and uterine fibroids, osteoporosis assessment and preterm birth risk assessment.

Also a member of SAMED, The South African Medical Device Association, MISA’s members include AEC-Amersham (Pty) Ltd, G.E. Healthcare, Siemens Healthcare, Philips Medical, Covidien, Vertec Scientific SA and Konica Minolta Medical.

"MISA’s activities are part of a global strategy that focuses on diagnostic imaging with women’s health being one of their core areas of focus,” adds Vogt.

MISA companies efforts to provide new and appropriate technology to meet the growing demand from healthcare institutions is gaining ground across the country. Recent examples include the installation of digital mammography products at military hospitals as well as at Universitas Hospital in Bloemfontein. One MISA company, to date supplied 42 digital units nationally.

Imaging product manufacturers are mostly international leaders in their field, offering cutting edge expertise, ongoing research and development and manufacturing to European and FDA standards.

According to Vogt, supplying the best technology to match healthcare needs is the first step towards better patient outcomes. Imaging companies also provide professional product support and training aimed at specialists, radiologists, surgeons and radiation oncologists. "Keeping healthcare professionals updated with new technology is another important consideration," says Vogt.

One of the latest additions to imaging technology is 3D breast tomosynthesis, an exciting new advancement that is an additional screening tool in the fight against breast cancer. This is an advance on 2D mammography screening.

3D technology has already been installed in Gauteng and the Orange Free State.

From cancer to heart disease, imaging offers a valuable tool for healthcare professionals’ diagnosis and treatment plans.
The green paper on the National Health Insurance (NHI) released recently for comment by the government, is more alchemy than panacea for SA’s healthcare ills, and is not the solution that this country needs or can afford.

Reform of our healthcare service is necessary and overdue, but the solution proposed by the green paper will not achieve the primary objective, which one assumes is better access to a defined comprehensive package of healthcare benefits, for all of South Africa’s citizens, at a price that is affordable to the state. One assumes this to be the case because the green paper is not clear on this point. On page 15 paragraph 50 for example it states that “the rationale for introducing National Health Insurance is (therefore) to eliminate the current tiered system” (my emphasis), suggesting that the elimination of the tiered system is the primary motive for introducing NHI, and that this action will magically lead to “improved access to quality health services, and provide financial risk protection against health related catastrophic expenditures for the whole population”.

The green paper fails to convince that NHI is the correct vehicle to deal with the serious health issues confronting South Africa and it fails on several fronts. Firstly, the paper fails to accurately diagnose the problems that need correcting, and as any forth year medical student knows, a misdiagnosis is likely to result in the application of the wrong remedial action. Secondly, the problems that are identified are couched in language suggesting a certain political ideology, suggesting that the diagnosis has been made to fit a certain ideological solution. This is the classical error of Procrustes* where the evidence is “made to fit” a preconceived diagnosis, rather than objectively examining all the evidence before arriving at a diagnosis, and only then deciding on what remedy to apply.

To illustrate:

On page 8 paragraph 6, the document refers to four key interventions that will need to happen simultaneously if universal coverage is to be successfully implemented. These are described as a complete transformation of healthcare service and provision, the total overhaul of the entire healthcare system, the radical change of administration and management and a re-engineered Primary Health Care system. No arguments or evidence is led as to why all these processes are either necessary or why they have to be achieved simultaneously.

The chosen model to achieve this is a single purchaser, single payer model but there are serious issues with such a model.

The green paper fails to convince that NHI is the correct vehicle to deal with the serious health issues confronting South Africa

Liz Still in her excellent publication “Health Care in South Africa 2011” describes twenty myths about single payer NHI systems listed in a book “Lives at Risk: Single Payer National Health Insurance around the world” by John Goodman, Gerald Musgrave and Devon Herrick, but nowhere in the green paper is any attempt made to defend or analyse the pros and cons of such a system – readers are simply expected to accept it at face value.

Elsewhere in the document (on page 8 paragraph 9), it is stated that “post 1994 attempts to transform the healthcare system and introduce healthcare financing reforms were thwarted” (my italics) but again no attempt is made to expand on this bald assertion.

On page 6 of the paper in paragraph 12 it refers to the negative attributes of the South African two tier system as “unsustainable, destructive, very costly and highly curative or hospice-centric”. These are serious claims but are unsubstantiated by any evidence, and in paragraph 15, the document talks of the high service tariffs, provider induced utilisation of services and the “continued over-servicing ” of patients in the private sector. Again these are all unsubstantiated statements without evidence to support them.

There is a persistent attempt in this document to link the poor performance in the public service to the two tier system of healthcare. This is ingenious and unbalanced, as it fails to acknowledge the role of failed ANC policies that resulted in the poor performance of the public healthcare service.

Policies such as, the freezing of public sector posts, the closing of nursing colleges, the deployment of inappropriate ANC cadres into positions of responsibility within the public service, the diversion of tertiary hospital funding, the failure to spend hospital budgets appropriately, the inattention to the maintenance of facilities, not to mention the provincial deficits running into billions of healthcare Rands, (found in the Consolidated Report of the Integrated Support Team (IST)), are some of the real causes of the deterioration of the public service over the past two decades. The private sector served a very important service here, insofar as had the option of private practice not been available, many practitioners that entered private practice because they were unable to find suitable positions within the public service, may otherwise have been lost to the country.

The green paper fails to convince that NHI is the correct vehicle to deal with the serious health issues confronting South Africa.
The second reason this document fails to convince, is to be found in the section devoted to the financing and the projected costs of the NHI. South Africa already spends about 8.4% of GDP on healthcare, more than the 5% recommended by the WHO and more than its emerging economy competitors, but with worse health outcomes. Nevertheless the NHI proposals suggest that spending even more money is the solution! The idea is apparently to tax taxpayers an additional tax roughly equivalent to the medical aid contribution.

This will have two possible results: One; the average medical scheme members will be unable to afford both their medical scheme contribution and pay the additional tax, so they will cease paying the former and migrate to the public service, but before the NHI is able to cope with this new influx. This will overload the public service with patients expecting a certain level of care, and simultaneously deprive service providers of their patients, but before the NHI can absorb either the patients or the service providers. The second possible result is that members will find a way to continue to belong to their medical scheme and private sector service providers will therefore not move to the public sector, which as a result will remain under resourced, the health indicators will not improve, but South Africans will now be spending about 11% of GDP on health!

The projected costs debate is one that the document is curiously silent on, sticking to the conservative estimates developed by the UCT Health Economics Unit team of McIntyre, Ataqua and Cleary who suggest that healthcare spending under NHI should roughly equal current spending. Other investigators are less sanguine, and one of the problems pointed to by Ashleigh Theophanides and the Deloitte team was not knowing, what NHI was designed to cover, and what impact supply side factors would have on the modelling. The document does not inform us on these matters.

Health economist Sevaas van den Berg of Stellenbosch University and Heather Mcleod estimate that the NHI would need R156 billion for an NHI package based on the current PMBs, R251 billion for a basic benefit package and R334 billion for a comprehensive package. Nicola Theron of Econex stated at the 2010 HASA conference, that her research suggested that additional tax revenue of R244 would be required while Annabel Bishop of Investec Bank writing in the Business Day, pointed out that the NHI working paper figures were in real terms, and that no inflation effects had been added. She calculated that if average salary and wage inflation figures were added, this would push the total NHI budget towards R850 billion by 2025, well beyond the ability of South African taxpayers.

With such huge variances in projected costs, it is not surprising that the green paper is coy on discussing these important but contentious issues. But unless these disparate reports are given serious consideration by the NHI Task Team, the NHI could end up being a disaster that would make the education debacle seem like a tea party.

The final reason why the green paper proposals should be rejected in their current form is because of the lack of accountability and information about the governance structures that will be necessary to ensure that such an enormous fund does not fall prey to corrupt officials. The continued inability of state and quasi – state organisations to balance their budgets and to avoid qualified audits, does not inspire confidence, something that the drafters of the green paper must have been keenly aware of, and yet there is not a single mention on how such large budgets are to be managed. A couple of pertinent examples of mis-management are the Gauteng Health Department, which cannot account for missing funds running into billions, and the National Health Laboratory Service (NHLS) which is owed collectively R1.6 billion by the Gauteng and KZN provincial hospitals (The Star).

The NHI cannot afford a situation where nurses and /or doctors go unpaid because of funds that have mysteriously disappeared and cannot be accounted for.

There is a better way. The Health Roadmap proposed initially by the Development Bank of South Africa (DBSA) and its Ten Point Plan, list the priorities for healthcare reform adopted at the ANC National General Council held in September 2010. NHI is the second point on the list, but if the other nine points were attended to first, there would probably be no necessity to introduce such a contentious and problematic system as this green paper proposes.

Dr Chris Archer
* Procrustes - according to Greek legend - was a robber of Attica who placed all who fell into his hands upon an iron bed. If they were longer than the bed he cut off the overhanging parts and if they were too short he stretched them until they fitted.
SAPPF Application Form

The SAPPF has been established in response to the extraordinary times we are living through and the enormous competing challenges facing the medical profession. The ethos of the SAPPF is to serve the profession. We have proven this already by challenging the RPL process and are now negotiating a settlement with the DoH. We hope that a cost based structure will soon be in place. Please join and assist in establishing a better deal for specialists in the long term.

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Bank details:
Account Name: South African Private Practitioners Forum
Bank: Absa Northcliff Branch
Code: 632005
Account Number: 4072908323
Account Type: Cheque

2011 Joining Fee - R1000 including vat

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011-782 0270

Where have all the doctors gone?

It's a question we hope we'll never have to ask. But without an affordable and accessible, quality healthcare service in which doctors in private practice are appropriately remunerated it's one which may become all too familiar. That's why the SAPPF are engaging the government and all appropriate industry bodies to find ways to enhance and protect the development of sustainable private practice as vital to the health and well being of all South Africans. Which leaves just one more question to answer. Are you a member yet?
Acute traumatic cervical spinal cord injuries: Correlating MRI findings with neurological outcome

M Ter Haar; SM Naidoo; S Govender; P Parag; TM Esterhuizen

Abstract

Study design: Retrospective, observational, cohort study.
Objectives: To evaluate whether quantitative and qualitative magnetic resonance imaging (MRI) assessments after acute traumatic cervical spinal cord injuries (SCI) correlate with the patient's neurological status and if they are predictive of outcome at long-term follow-up.
Materials and methods: Eighty-eight patients (77 male, 11 female) with traumatic cervical spinal cord injuries who were admitted to the spinal unit, were evaluated over a period of five years (Jan 2004–Dec 2008). Neurological impairment was classified using the Frankel classification both on admission and discharge. MR imaging was done on all patients using both T1- and T2-weighted sagittal scans, axial T2-weighted scans and axial gradient recalled echo imaging (for evaluation of haemorrhage). Three quantitative imaging parameters (maximum spinal cord compression (MSCC), maximum canal compromise (MCC), and length of lesion as well as five qualitative parameters (intramedullary haemorrhage, cord oedema, cord swelling, disc herniation and soft tissue injury) were evaluated and correlated to the patient’s neurological outcome.
Results: Patients with a complete motor and sensory SCI (Frankel A) had higher frequencies of intramedullary haemorrhage (p<0.001), cord swelling (p=0.002) and cord oedema (p<0.001) compared to the incomplete SCI (Frankel grade B, C and D) and those without any neurology (Frankel grade E). Patients with complete SCI also had a more substantial MSCC (p=0.008), MCC (p=0.009) and lesion length (p=0.001) compared to the other two groups. The length of lesion (p=0.019) and intramedullary haemorrhage (p=0.001) correlate with baseline neurology. MSCC (p=0.063), length of lesion (p=0.011) and intramedullary haemorrhage (p=0.036) were predictive of a poor neurological outcome.
Conclusion: The study demonstrated MR imaging to be a useful tool in prognosticating a patient’s potential for neurological recovery. It indicated that MSCC, length of lesion and intramedullary haemorrhage are associated with a poor prognosis for neurological recovery.

Introduction

Injuries of the cervical spine are commonly associated with devastating trauma to the spinal cord with consequential neurological impairment. Prior to the use of magnetic resonance imaging (MRI) as a diagnostic and prognostic modality, neurological recovery according to the Frankel classification has been the only predictive value in SCI. Currently MRI is the radiological modality of choice in spinal cord injuries (SCI) to assess the degree of spinal cord damage and possible neurological recovery.

Several studies have been done on qualitative findings such as cord haemorrhage, cord oedema, cord contusion, soft tissue injuries and herniated disc, correlating them with the degree of neurology deficit and neurological recovery in cervical SCI. A few studies have focused on quantitative MRI values in patients with acute cervical SCI. Fehlings et al developed a reliable quantitative radiological method for assessing spinal cord compression and spinal canal compromise. In a study by Miyangi et al both quantitative and qualitative MRI parameters were combined for the prediction of the patient's neurological recovery.
The purpose of our study was to correlate both quantitative and qualitative MRI parameters to the patients' neurological status and assess them as possible predictors of long-term neurological outcome.

**Materials and methods**

**Population group**

A retrospective cohort analysis was performed on 88 consecutive patients with acute cervical SCI due to trauma in the KwaZulu-Natal province, South Africa. All the patients were initially treated and stabilised in the referral hospitals and then referred to the spinal unit at King George V hospital in Durban for assessment and definitive treatment. None of the patients in the study received any methylprednisolone as part of the initial and subsequent management. The study was over a five-year period extending from January 2004 to December 2008. Our patient selection criteria were as follows:

**Inclusion criteria** – 1) All adult patients who had acute cervical spinal cord injuries between 1 January 2004 and 31 December 2008 who had an MRI done of their cervical spine. 2) Only patients who had been treated in the Spinal Unit.

**Exclusion criterion** – 1) Patients who had acute cervical spinal cord injuries during this period but who did not have an MRI done.

**Neurological assessment**

A total of 88 patients, (77 male, 11 female) were examined and recorded. The Frankel classification system for motor and sensory score was used as the neurological assessment on admission and on last visit. The patients were then divided into three groups according to the severity of their SCI: Group A were complete spinal cord injuries (Frankel grade A); Group B were incomplete spinal cord injuries (Frankel grade B,C or D); and Group C were those with no neurology (Frankel grade E). The initial Frankel grading on admission was compared to the Frankel grading on discharge from the hospital as well as the Frankel grading on the last follow-up visit to determine any neurological improvement or deterioration.

**MR imaging**

An MRI scan of the C-spine was done on all the hospital patients. The average time to scan was eight days.

MRI was obtained using a 1.5 Tesla superconducting MR scanner (Siemens Symphony 1.5T) with a surface coil. T1-weighted images were obtained with an echo time of 14 milliseconds and a pulse repetition time of 525 milliseconds, while T2-weighted images were obtained with an echo time of 110 milliseconds and a repetition time of 3400 milliseconds.

The slice thickness was 3mm for T1-weighted sequences and 2mm for the T2-weighted sequences.

Both a T1- and T2-weighted sagittal and T2-weighted axial imaging were done on all the patients. Gradient recalled echo sequence to determine the presence of cord haemorrhage was also performed. These images were then examined by a radiologist. The radiologist was blinded to the patient’s clinical and neurological data. The assessment and interpretation of the MRI images were divided into quantitative and qualitative measures.

Three quantitative measures were used: maximum canal compromise (MCC), maximum spinal cord compression (MSCC) and length of lesion. Mid-sagittal T1- and T2-weighted imaging were used to determine the MCC and MSCC respectively as described by Fehlings et al. This value was determined by measuring the distance of the canal or spinal cord one segment above and below the lesion respectively to calculate the average distance. The distance was then measured at the site of the lesion and expressed as a percentage of the average.

The length of the lesion was determined on T2-weighted images. This length was determined as the distance between the most cephalic and most caudal extent of the cord signal.

The qualitative MRI findings that were used in addition to the quantitative variables, as determined by T2-weighted imaging, included cord haemorrhage, cord oedema, cord swelling, disc herniation and soft tissue injury (STI).

The level of the SCI was determined by the radiological assessment of the osseous injury on a lateral C-spine X-rays as well as the level of maximum cord compression as seen on MRI.

**Statistical analysis**

Univariate and multivariable analysis was used to assess quantitative and qualitative factors associated with neurological outcome. Quantitative MRI findings were non-normally distributed, thus non-parametric Kruskal-Wallis tests were used to compare their distributions between the three neurological groups. Pearson's Chi-square tests were used to compare the proportions of the qualitative variables between the three groups.

The study was over a five-year period extending from January 2004 to December 2008.
Two multivariable linear regression models were created to assess the independent roles of the various factors in predicting neurological status at admission and discharge. The dependent variables were scored between 1 and 3, with 1 being Group A and 3 being Group C. A backwards modelling approach was used, with probability of removal set at p=0.10. Step one included all variables which were found to be significantly associated with the dependent variables on univariate analysis. The model to predict follow-up Frankel score was not adjusted for baseline Frankel score and some of the predictors. SPSS version 15.0 (SPSS Inc., Chicago, Illinois) was used to analyse the data. A p-value <0.05 was considered as statistically significant.

**Results**

From the total of 88 patients that had SCI, 77 (87%) were male and 11 (13%) were female (see Table I). The average age was 37 years (range 18–87). The most common mechanism of injury was motor vehicle accidents (MVA) (65%), and the most frequently involved level was C5 through C6 (33%). Most of the patients had an incomplete lesion on admission 39 (44%). The mean follow-up of the patients was 12.4 months. Of the total of 88 patients, four were lost to follow-up. On discharge from the hospital 42 (87%) were male and 11 (13%) were female (see Table I).

The most common type of surgery performed on the patients was anterior spinal fusion (ASF). Median time to surgery was 32 days. The reason for the delay in surgical treatment was mainly due to the time lost during the referral from other hospitals as well as the difficulty in obtaining an MRI scan.

**Analysis of quantitative MRI variables**

The mean extent of MCC was significantly different between the patients with complete SCI and incomplete SCI (p=0.009). A more substantial degree of MCC was seen in the complete group. There was very little difference in the MCC between the incomplete group and those without neurology.

The mean extent of the MSCC was also significantly different between the groups (p=0.008). A more substantial MSCC was found in the patients with a complete lesion compared to the other two groups. Similar to the findings with MCC there was little difference in the MSCC between the incomplete group and those without neurology.

**Discussion**

Previously the Frankel classification has been the only method to determine the neurological status and possible recovery of patients after SCI. The use of MRI is now well established as the method of choice in examining patients with SCI, and correlating it with their neurological status and using it as a possible predictor of neurological recovery.
Acute traumatic cervical spinal cord injuries: Correlating MRI findings with neurological outcome

Although CT scan is superior in detecting precise bony injuries, MRI is the most sensitive modality for detecting spinal cord damage, disc protrusions and paraspinal soft tissue injuries. The diagnosis of the initial injury is critical in order to predict an accurate functional prognosis. The best time for prognostic imaging appears to be within the first 24-72 h of the injury and 2-3 weeks later. In our study the mean time to MRI scanning was eight days. This delay was due to the difficulty in obtaining an MRI scan at the Radiology department within such a short period of time.

The results of our study show that after using multivariable regression analysis, intramedullary haemorrhage and length of lesion correlated significantly with baseline neurological status. Only intramedullary haemorrhage, MSCC and length of lesion were key predictors of neurological recovery after an SCI.

The fact that cord oedema and cord swelling was not statistically significant in correlating with baseline neurology, or as a predictor of outcome, was most probably due to the confounding effect of cord haemorrhage. Patients with a more substantial MSCC, length of lesion, cord haemorrhage, cord oedema and cord swelling, had lower Frankel gradings. The patients with complete SCI had a more substantial MCC, MSCC and length of lesion as well as a higher frequency of intramedullary haemorrhage, cord oedema, cord swelling, disc herniation and soft tissue injury compared to the incomplete injuries and neurologically healthy patients. The results of our study were very similar to those of Miyani et al., but we did not analyse for pre-injury stenosis degree of bone and soft tissue injury does not directly relate to the degree of injury.

Their study also supports the perception that the degree of bone and soft tissue injury does not predict the resultant spinal cord injury.

In theory, patients with pre-existing spinal stenosis and degenerative spondylolisthesis should be predisposed to a more severe spinal cord injury during hyperflexion and hyperextension of the cervical spine. Their explanation for this is the possibility that spinal cord injuries in elderly people, who usually have underlying cervical spondylolisthesis, are less likely to be caused by sport-related activities or high speed motor vehicle accidents like in the younger population.

Their study also supports the perception that the degree of bone and soft tissue injury does not predict the resultant spinal cord injury.

Qualitative MRI variables

Miyani et al. and Rao and Fehlings noted that in most studies to date the qualitative parameters have been used to examine the association between imaging parameters and neurological outcome in SCI, but that there was a lack of studies in which the quantitative parameters (degree of spinal canal compromise, cord compression and length of lesion), was quantified. Kang et al. attempted to quantify canal compromise by using lateral cervical radiographs. Hayashi et al. quantified cord compression at the level of maximum compression by using MR imaging and dividing it into mild (cord diameter of more than two-thirds) and severe cord compression (cord diameter of less than two-thirds). We used an objective method, which has previously been approved to be reliable, standardised and objective, to quantify MR images obtained from patients with SCI.

In our study there was a significant difference in all three parameters assessed between patients with a complete SCI and those with incomplete SCI and neurologically healthy patients. In particular, it was much greater in the complete injuries for MSCC, MCC and length of lesion compared to the other two groups.

The relation between bone and soft tissue injury and underlying cord damage has not yet been fully clarified. Although Miyani et al. in their study found that there was a correlation between old age and more substantial cord compression most probably due to underlying pre-existing degenerative changes, Flanders et al. found that pre-existing cervical spondylolisthesis did not directly relate to the degree of injury.

Their study also supports the perception that the degree of bone and soft tissue injury does not predict the resultant spinal cord injury.

Qualitative MRI variables

Although the cord is subjected to secondary insults following the initial trauma, it is generally accepted that the extent of cord damage is mainly caused by the amount of force at the initial impact. Although the cord is fairly resistant to direct physical (structural) disruption, a very minor injury can cause significant cord malfunction. Several authors have described the most common MRI patterns of the cord following SCI, haemorrhage (Type I pattern), cord oedema (Type II pattern) and cord contusion (Type III pattern). The presence of spinal cord haemorrhage on MRI represents the most severe form of spinal cord damage and is associated with very poor neurological function. These patients are more likely to have complete neurology and several authors showed that cord haemorrhage was associated with a complete neurology which was irreversible with no chance of any neurological recovery.
Acute traumatic cervical spinal cord injuries: Correlating MRI findings with neurological outcome

Other authors differ in this regard and showed that although the presence of cord haemorrhage was associated with a high degree of complete neurology and a poor prognosis in terms of neurological recovery, the presence of haemorrhage does not always imply complete neurology without the possibility of any recovery. These authors agree that the size of the haemorrhage influences the severity of neurology. The presence of a small area of haemorrhage is often associated with incomplete neurology.

In a study by Boldin et al, the presence of haemorrhage of less than 4mm was not associated with a complete SCI and showed a good prognosis compared to the patients with complete SCI who had a median haematoma length of 10.5 mm. Flanders et al showed that patients with cord haemorrhage had better motor recovery of the upper extremities with very little improvement of the lower extremities. All authors agree that the absence of cord haemorrhage after SCI is associated with less neurological impairment and has a much better prognosis for neurological recovery.

The presence of cord oedema represents a less severe form of cord damage and is often associated with incomplete injuries and a favourable prognosis.

Evidence of extensive cord oedema was associated with complete injuries and a poor outcome. This has been confirmed in a study by Boldin et al, who found that patients with complete injuries had significantly longer oedema (40-150 mm) and a worse outcome than patients with incomplete injuries (0-54 mm). According to Shepard and Bracken, MRI evidence of cord oedema was the strongest predictor of reduced improvement in motor function. Patients with minimal or no cord changes on MRI are often associated with minimal neurological deficit and have the best prognosis, followed by those with cord oedema.

Our study found similar results in our qualitative assessment to that of the literature. Cord haemorrhage, cord oedema and cord swelling were significantly more frequently associated with complete injuries. Although cord haemorrhage had a high association with complete neurology and is a predictor of poor neurological recovery, the possibility of neurological recovery is not excluded. Cord oedema and cord swelling had a high association with incomplete neurology but multivariable regression analysis showed it is not a predictor of neurological recovery.

Further studies, however are, needed looking more specifically at the length of lesions for both cord haemorrhage and cord oedema in order to find a more precise correlation between MRI findings and neurological outcome.

As mentioned in the literature, it is very difficult to make an exact correlation between the static findings on MRI, which is an underestimation of the dynamic events of the spinal cord at the time of injury, and the severity of neurology. One can however correlate these qualitative and quantitative variables to the neurological status of the patient and, more importantly, it can be used in prognosticating a patient’s potential for neurological recovery.

The study has shown that patients with complete injuries have a small chance of neurological recovery compared to those with incomplete neurology who have a much more optimistic prognosis. One should always remember that some patients recover far beyond the anticipated prediction and conversely others have minimal improvement from what initially appeared to be a minor injury.

Conclusion

In our study we found MRI to be a very useful tool in evaluating the patient with an SCI and that MRI findings can be correlated to the neurological status of the patient. It can also be used as a prognosticator for possible neurological recovery. We demonstrated that the presence of a more substantial MSCC, length of lesion and intramedullary haemorrhage are associated with a poor prognosis for neurological recovery.

References


Further References are available on request.