The Experience of using Chronic Disease for Risk Equalization in South Africa

Prepared for the RAN meeting in 2008

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The Experience of using Chronic Disease for Risk Equalization in South Africa

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Abstract

The risk equalization formula developed in South Africa in 2003 and confirmed in 2007 uses age, gender (not yet implemented), maternity events, numbers with one of 26 chronic diseases and numbers with multiple chronic diseases.

The Risk Equalisation Fund has been operating in a shadow mode since 2005 with data being collected but no money changing hands. This paper describes the issues that have arisen and the experience during the shadow period with implementing chronic disease in the risk equalization formula.

The experience in a highly competitive environment and measures taken to combat over-reporting of chronic disease should be useful for countries considering adding chronic disease to their risk equalization formulae.

This version of the paper concludes with unresolved issues and questions for discussion by the RAN group in Dublin in March 2008.

1. Introduction

In a separate paper we describe the health financing reforms in South Africa and rationale and methodology for introducing risk equalization between private sickness funds[1]. The risk equalization formula developed in 2003 aims to equalize the expected price for the minimum benefit package, the Prescribed Minimum Benefits or PMBs (see Appendix A for detail). The Risk Equalisation Fund (REF) is still in the process of being legislated but has been operating in a shadow form since January 2005. During the shadow period monthly summarised data is submitted quarterly to the Council for Medical Schemes by some 125 funds but no money changes hands.

The risk factors in the risk equalization formula are predominantly prospective and are follows:

- Age last birthday on 1 January, summarised into age bands Under 1, 1-4, 5-9, 10-14, …, 75-79, 80-84, 85+.;
- Gender (recommended for inclusion from 1 January 2007 but not yet implemented);
- The 25 PMB Chronic Disease List (CDL) conditions. Where a beneficiary has more than one chronic condition the fund may select the most expensive of the conditions.
- HIV/AIDS provided the beneficiary is receiving anti-retroviral therapy according to national guidelines;
- An additional factor for multiple chronic conditions with provision for 2, 3, or 4+ simultaneous chronic conditions; and
- A retrospective factor for maternity events, defined as the delivery of a single/multiple foetus, either stillborn or alive.

This paper describes the issues that have arisen and the experience during the shadow period with implementing chronic disease in the risk equalization formula. The experience in a highly competitive environment and measures taken to combat over-reporting of chronic disease should be useful for countries considering adding chronic disease to their risk equalization formulae. Section 2 describes the definitions that have evolved over three years of experience while section 3 illustrates aspects of that experience. The paper concludes with unresolved issues and questions for discussion by the RAN group.

2. Definition of Chronic Disease

2.1 Minimum Benefit Package and Therapeutic Algorithms

The minimum benefit package (see Appendix A) has evolved since it was legislated in 1998 and implemented from January 2000. The initial package of diagnosis-treatment pairs was perceived by many funds to cover only hospital-based treatment and several funds altered their chronic medicine benefits to reduce or completely remove cover for chronic diseases. This behaviour was driven by the need to risk select in a voluntary environment where explicit risk-rating was not allowed. The policy response was legislation in 2002 to mandate a package of diagnosis, treatment and medicine for 25 chronic conditions. The implementation was delayed for a year to enable the industry to develop therapeutic

[1] In South Africa the private sickness funds are called “medical schemes” and risk equalization is “risk equalisation”. The terminology has been aligned to that adopted by W.P.M.M. van de Ven et al. in Health Policy 65 (2003) 75-98, and the preferred usage by the RAN group of “risk equalization”.

algorithms which were legislated and came into effect from January 2004 (see Appendix B for an example).

The choice of the 25 diseases for the minimum package remains contentious. The original philosophy underlying the PMBs used a clear method for rationing and determining the package [1, 2]. However the methodology for determining which diseases were included in the Chronic Disease List was not published and has been described as 25 "common conditions". Even this is in doubt as diseases like Addison's are more rare and less costly than cystic fibrosis, which was not included. Research on the prevalence and cost of the CDL diseases [3] showed that 77.1% of people registered for chronic medicine in 2001 had at least one of the CDL conditions.

At the time the REF formula was being designed in 2003, the minimum benefits for the CDL conditions had not yet come into effect. The initial research and recommendations for the risk equalization formula [4, 5, 6] had found that chronic disease was a significant explanatory variable and should be included in the formula. The consensus decision in 2003 was that it made sense to include each of the 25 chronic conditions as it would encourage funds to identify, monitor and manage those with the new CDL diseases[2].

The REF Study 2002 was carried out using data from the two largest administrators for calendar year 2002. The dataset covered some 33 million member months of experience which represented 41% of the private healthcare market. The age-adjusted prevalence of chronic disease was found to be very similar between the two administrators and both used similar chronic medicine management programmes.

2.2 Concerns with Different Clinical Approaches to Disease

Concern was expressed in the original formula report [5] about the ability to reliably measure the chronic disease factors and about the ability to audit this data. It was seen as critical that there was a trusted and fair way to determine the numbers with chronic disease. As the proposed Risk Equalisation Fund moved towards the collection of the first data from the entire industry in January 2005, concerns were increasingly expressed about the comparability of disease data across all funds. In 2005 there were 29 third-party administrators and a further 20 funds were self-administered. Each administrator could potentially have different standards for determining eligibility for chronic disease although several used common services for software and data-switching and hence effective common standards.

The Risk Equalisation Technical Advisory Panel (RETAP) continued technical work on the formula and data collection. The clinical team on RETAP produced a report in February 2005 [7] with a first attempt to draw together common clinical standards for the identification of the CDL conditions. It was recognised that there would need to be a different standard applied to those already on treatment and new cases diagnosed. Although the entry criteria would in principle also apply to existing chronic patients, patients would not be required to stop their medication to prove compliance. A typical example is hypertension where initial diagnosis requires a particular blood pressure level which is now no longer observable on treatment.

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[2] While HIV/AIDS is not technically a CDL disease, it is described in the minimum package. References to the CDL conditions with regard to REF include the official CDL list and HIV.

2.3 Development of Entry and Verification Criteria

The initial work by RETAP on entry criteria was considerably expanded as the clinical team at the Council for Medical Schemes was strengthened and consideration was given to the systems needed to capture and verify data before risk equalization. This resulted in a comprehensive manual of Verification Criteria that is now in its third iteration [8]. Table 1 shows the Verification Criteria developed to date and their applicability.

Table 1: Applicability of REF Entry and Verification Criteria

Version	Date Issued	Applicable to cases reported from
Version 1	22 November 2005	1 January 2006
Version 2	11 May 2006	Intended 1 January 2007. Used in REF Study 2005.
Version 2.1	20 April 2007	Retrospective to 1 January 2007. Includes evidence from REF Study 2005.
Version 3	30 October 2007	1 January 2008

Successful implementation of the Risk Equalisation Fund is considered to be contingent on the accurate identification of beneficiaries with specified risk factors. The Entry and Verification Criteria define uniform criteria that must be met by all funds in the identification of beneficiaries with the REF risk factors.

Importantly, the Verification Criteria are not intended to alter the definition of the minimum benefit package and there will be instances where a beneficiary is legally entitled to a PMB in respect of a particular condition, but does not qualify for purposes of the REF as a beneficiary with the particular risk factor. This is particularly the case with certain medicines which are used to determine proof of treatment for REF but as these medicines are not included in the CDL therapeutic algorithms, they do not create an entitlement of a beneficiary to access that medicine as a PMB.

The Verification Criteria have been developed with the emphasis on the verifiability of cases and are used to ensure that gaming of the REF is identified and addressed. There are two elements to the criteria (see Appendix C for an example):

- the **diagnosis** of a particular disease, which includes specification of applicable ICD-10 codes and limitations on the practitioners that may diagnose certain complex conditions. There may also be certain mandatory tests needed to differentiate between diseases and these test results must be retained by the fund; and
- a **proof of treatment** element which is based on paid claims data. Initially this was based on payment date information but was changed to service date information in Version 2.1 which is less open to manipulation.

Table 2 shows the time lag in collecting proof of treatment data which typically must be demonstrated for at least two of the three calendar months prior to the month of submission. Medicines are classified using the Anatomical Therapeutic Chemical (ATC) classification[3].

[3] An updated version of the ATC Index is issued annually by the WHO Collaborating Centre for Drug Statistics. See http://www.whocc.no

Table 2: Application of Proof of Treatment Criteria

Application of proof of treatment requirements in instances where proof of treatment is required for two calendar months in the three months preceding the calendar month for which REF eligibility is determined		
Month:	**Treatment provided and paid for from a risk pool:** *(Use service date to allocate to a specific month)*	**Eligible for Inclusion in the REF grids:**
Jan	Yes	No
Feb	Yes	No
Mar	Yes	Yes
Apr	Yes	Yes
May	Yes	Yes
Jun	No	Yes
Jul	No	Yes
Aug	Yes	No
Sep	Yes	No
Oct	Yes	Yes
Nov	No	Yes
Dec	No	Yes
Jan	Yes	No
Feb	Yes	No

2.4 Rules for multiple diseases within disease groups

Rules for multiple chronic conditions within disease groups were created to deal with substantial "code-creep" that seemed to be occurring. The clinical members of RETAP expressed concern that there was not enough difference between the diagnoses for chronic heart failure and cardiomyopathy and it was not correct to assign both diseases to the same person. Accordingly these were combined and only cardiomyopathy could be allocated from 2006 onwards.

Concerns with the assignment of multiple codes for the three respiratory diseases (asthma, bronchiectasis and COPD[4]) had also been experienced. Following exposure to the work of Professor Ellis [9], it was resolved to tackle the issue more aggressively. The approach adopted in Version 2 of the Verification Criteria is similar to the concept of hierarchical co-existing conditions.

The rules for multiple diseases within disease groups require that only one of the following diseases be selected in each group (ranked by most expensive disease[5]):

- **Respiratory rule**: COPD, asthma, bronchiectasis;
- **Cardiac rule**: cardiomyopathy (coupled with chronic heart failure), ischaemic heart disease, dysrhythmias, hypertension;
- **Renal rule**: chronic renal failure, hypertension;
- **Gastrointestinal rule**: Crohn's disease, ulcerative colitis;
- **Diabetes rule**: diabetes mellitus Type 1 and 2 (always default to Type 2 for both)

[4] Chronic obstructive pulmonary disease
[5] Order of diseases from REF Contribution Table 2007 including gender as a risk factor.

- **Psychiatric rule**: bi-polar mood disorder and schizophrenia
- **Neurological rule**: multiple sclerosis, bi-polar mood disorder and epilepsy; and
- **Skeletal rule**: systemic lupus erythematosus, rheumatoid arthritis.

2.5 Development of a beneficiary-level database

During the shadow period, funds submit the data in the form of highly summarized REF Grids. However, this form of data submission is not readily auditable, as discussed in the experience in section 3. The Council for Medical Schemes recommended to the Department of Health that before actual transfers occur it is essential to establish a more secure method of data collection and storage.

It is envisaged that a registry of all people on sickness funds be maintained by the Council in order for the REF to fulfil its future role as the institutional vehicle for Social Health Insurance. The registry would contain unique identifying information to ensure that a person could not simultaneously be a member of two funds. This ensures that government subsidies and risk-adjusted payments are correctly allocated to funds depending on their validated beneficiaries. The REF would separately hold detailed information relative to the REF risk factors to be able to calculate the risk-adjusted payments. A key issue in process design is the care being taken to ensure member confidentiality. In order to track contributions to Social Health Insurance, linkages to South African Revenue Services (SARS) have been explored. It was envisaged that SARS would provide the secure infrastructure for the collection of future social security contributions for health.

The registry of beneficiaries has been built and tested with some industry data. However it will require enabling legislation to be passed before data can be formally requested from the whole industry. This legislation, which also establishes the governance for the Risk Equalisation Fund, has been severely delayed and has not yet been submitted to parliament. This has led to a delay in implementation of REF from an envisaged date of 2007 to perhaps at least 2010.

3. Experience with the identification of chronic disease

The adage that “you get what you incentivise” has been very much in evidence in the collection of data on chronic disease during the shadow period. It is interesting to reflect that the behaviour of administrators and funds with respect to submissions has been on the promise of future risk equalization transfers as no money has yet changed hands.

3.1 First industry-wide data submitted

The initial work in the REF Study 2002 was based on 41% of industry beneficiaries but only two of the nearly 30 administrators. The first data for the whole industry was received in late July 2005 and was in respect of the first quarter of 2005 [10]. It was immediately apparent that other sources of data were always needed for cross-checking the submitted data as even the number of beneficiaries was not consistent across two separate submissions to the same regulator. Many funds were found to be submitting different beneficiary numbers in their quarterly statutory returns compared to their quarterly REF submissions. The problem was identified in internal systems where two separate groups of people extracted and submitted the data, without checking for consistency.

The REF tables give a lower amount for age 85+ than for age 80-84 and a substantially higher amount for Under 1s than for age 1-4. It was thus perhaps no surprise that funds in September 2005 [11] were reporting only 94% of the beneficiaries in the age 85+ category yet 127% of the Under 1s compared to the numbers reported in the statutory returns for the same month. Despite being alerted to the discrepancy after the first quarterly returns, this pattern persists and is cause for some concern. The industry argued that there had previously been no incentive to get the age data correct. Checks were also developed to link the number of births to the number of new Under 1s in subsequent months and this assisted to find some of the more problematic data.

The first disease data for the entire industry proved to be hugely surprising compared to expected values from the 2002 study. It was found that for chronic renal disease there were 15,799 cases reported when only 1,978 had been expected (actual to expected of nearly 800%). A similar problem was found with haemophilia where 2,975 cases were reported when only 245 cases had been expected (more than 1200% increase). The magnitude of the discrepancies was too great to be realistic and further analysis showed that the problem was concentrated in a small number of administrators. Interestingly, the massive over-reporting was in the diseases where the highest amounts were intended to be paid by REF.

This experience led to a focus on the administrators as a primary unit of analysis. It was found that patterns within funds were typically repeated throughout an administrator. It was apparent that the two initial administrators who had participated in the REF Study 2005 had more robust systems and that the experience of working on the REF Study had given them an advantage in resolving internal data issues. Groupings of administrators were also used for analysis, for example administrators that used the same data clearing house or the same systems developers.
Figure 1 shows the rapid improvement in data submitted for chronic renal failure over the first 21 months of data submission. “Code RED” administrators were five administrators with particularly problematic initial data.

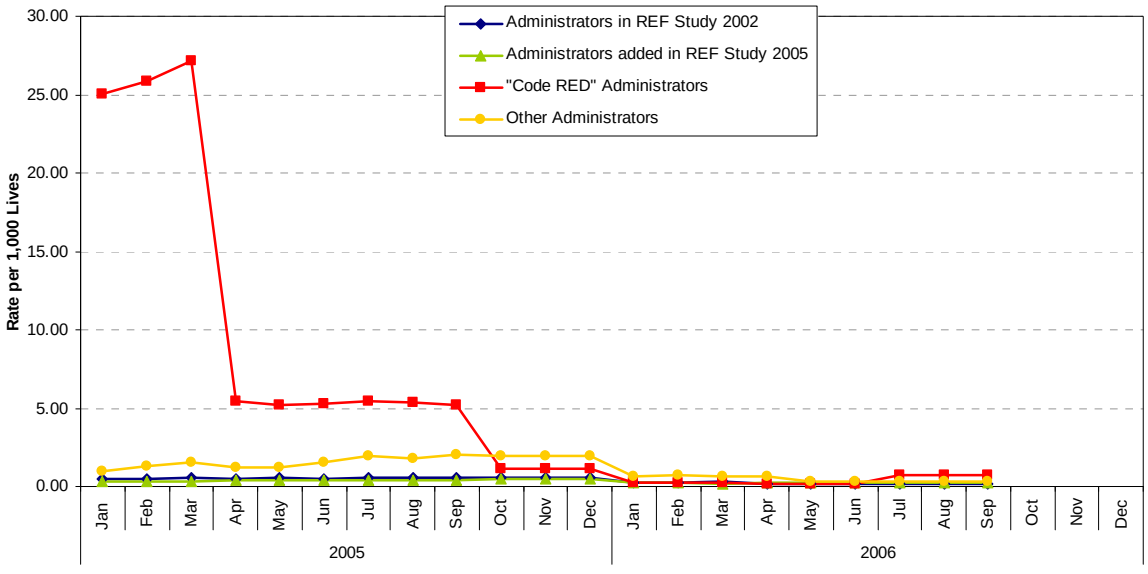


Figure 1: Rate per 1,000 Lives for Chronic Renal Failure by Administrator Groupings

The differences between administrators persist due to the application of different entry criteria for access to chronic disease benefits. While there were some differences in these criteria at fund level, it was found to be more common for the administrator to propose and implement a particular "house" set of criteria. Other reasons for the maintenance of the different patterns were as follows:

- Networks of healthcare providers that were contracted and remunerated on a basis other than fee for service often did not collect and could not supply data on chronic disease to the funds;
- Medicine clearing houses that did not collect hospital data so could not submit data on maternity events.
- Medicine clearing houses that imposed their own criteria for the identification of chronic disease, including automatically determining chronic disease from the medicines dispensed.
- Medicine clearing house data that had been passed though the administrator without additional checking and that had been signed off by the trustees and fund officers without adequate checking.

Over the first year tools and skills were rapidly developed to identify data that seemed unusual for the age profile of each fund. There were also substantial learnings in terms of the typical expected shape by age for each of the diseases. The experiences led to the urgency for creating the Verification Criteria and rules for multiple conditions described previously.

3.2 Issues with Application of Entry and Verification Criteria

Figure 2 shows the pattern of total chronic conditions over the first 30 months of collecting data for risk equalization. Age profiles naturally play a role and this analysis should ideally be done on an age-adjusted basis. The difference in age profiles between administrators is less important in the graph than the delayed or partial implementation of the Verification Criteria. The regulator had encouraged funds to implement Version 2 of the criteria in advance, instead of waiting for January 2007, and this complicated matters in 2006.

The two administrators that had participated in the first study in 2002 (blue line) had gained substantial knowledge about REF data collection and their data was usually clean on submission. The graph shows reasonably stable total chronic levels through 2005 and a substantial decrease from 140 per 1,000 to a new level of about 100 per 1,000. These administrators implemented Version 2 of the verification criteria in advance from the beginning of 2006 data collection. Note the "spoon-shape" in the first quarter of 2006 as evidence for the proof of treatment criteria is gathered for the first time.

The other administrator groups in
Figure 2 did not show the same decline in total chronic conditions and also have data patterns that are more irregular. The two administrators that were added to the REF Study 2005 (green line) had chronic rates much higher than the blue line in 2006 but as the Version 2.1 criteria were implemented, so the general level began to approximate that of the blue line. The "Code RED" administrators (red line) appear to have implemented Version 1 in three months in advance of 2006 but the general level and rising pattern going into 2007 is cause for concern that Version 2.1 may not have been implemented as expected. The "other"

administrators (yellow line) have a very variable chronic rate. The general level would be cause for some concern that Version 2.1 may not have been fully implemented by some of the smallest administrators.

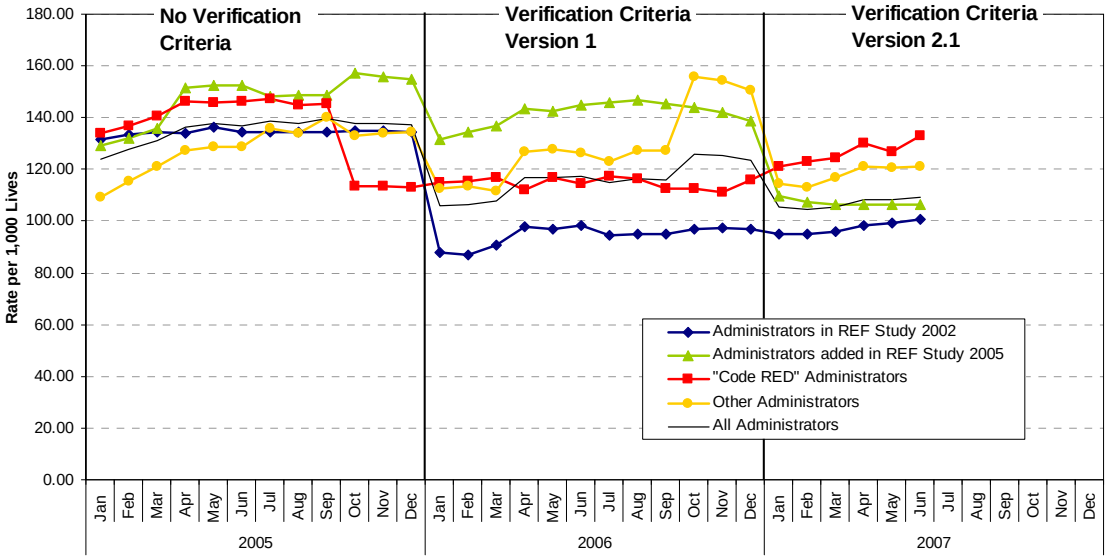


Figure 2: Rate per 1,000 Lives for Total Chronic Conditions by Administrator Groupings

Data received in 2006 was particularly difficult to work with and it was almost impossible to determine the REF transfers that might have occurred. Ideally, information should have been collected on the extent to which the Verification Criteria had been implemented (not implemented, Version 1 implemented as required, Version 2 implemented in advance) and different tables applied to each group. While the picture has improved for 2007, there still appear to be administrators who are reporting chronic levels which are unusually high and which need to be excluded or modified in the calculation of the REF transfers.

Figure 2 also shows a general upward drift in the total chronic conditions over many of the groups and periods. It was apparent from the data received at fund level that as administrators learned more about REF and implemented improved systems, so more chronic disease was identified.

Some of the options in funds with seemingly very low levels of chronic disease were found to have used networks of healthcare providers for primary care. These providers were typically capitated and thus the funds could not “see” the chronic disease or gather the necessary proof of treatment. Instructions from the regulator made it clear that funds were fully responsible for reporting and that their contracts with networks should make provision for the information required to prepare the REF grids.

Beneficiaries that are receiving treatment for a chronic condition that transfer to another fund needed to be treated differently. The receiving fund might not have the diagnosis information or the results of tests that allowed a particular diagnosis. It was agreed that REF would rely on proof of treatment information in these cases. However the new fund would have a lag in building up proof over the first three months. If substantial numbers transferred, then “spoon-shaped” disease patterns would occur as discussed above. It is envisaged that once a

central registry of beneficiaries is established, that the receiving fund would get the information on which diseases had been authorised and the history of proof of treatment would be carried over without a break.

The initial criteria for proof of treatment developed by the clinical team were based on date of payment for the medicine. While the actuaries initially thought that the cost of gaming this would be costly, some administrators immediately saw the potential for improving their chronic numbers. If a medicine script carried more than one item that could be used for proof of treatment, paying for one item in the first month and other items in the second month seemingly gave two months of treatment. The definitions were altered in Version 2.1 of the Verification Criteria to be based on date of service, not date of payment.

3.3 Auto-chronic Processes

Figure 2 shows that the pattern of total chronic disease for the two administrators that were added in the study in 2005 was not smooth and increased substantially over both 2005 and 2006 (although from a lower base). One of the two administrators had made use of so-called "auto-chronic" processes to identify lives as chronic. There had been considerable interest at RETAP in understanding the persistently high chronic disease counts from this administrator and a full study in 2005 provided an opportunity to explore the issue. The administrator provided additional data showing the various ways in which an auto-chronic diagnosis could be made. These three columns with (Y/N) indicators are described below. The columns are not mutually exclusive, as the patient may be identifiable by all three methods.

- **Authorisation ICD:** a granted authorisation for a CDL disease was found but outside of the calendar year of the study in 2005 (i.e. during 2006 or before 2005);
- **Claim ICD:** there was a claim from a healthcare professional with an ICD-10 code indicating that a diagnosis was made for a CDL disease. Either the dispensing provider or the prescribing provider on a claim from any period was a medical practitioner; and
- **Crosswalk ICD:** a proxy diagnosis for a CDL disease was made using an in-house NAPPI[6]-ICD crosswalk.

Four sets of data were constructed from the data, as shown in Table 3 and illustrated in Figure 3. The use of different approaches to identify chronic disease has a very large impact on the number of chronic lives. The table summarises the number of chronic lives and chronic prevalence across the four sets of "treated patient" data.

[6] National Pharmaceutical Product Interface (NAPPI) is the national standard for product coding. There is a unique identifier for each medicine (at dosage and pack size level) and each surgical product.

Table 3: Chronic Lives and Prevalence in MHG TREATED Data Sets

Data Set	Description	Number of Chronic Lives	Chronic Rate per 1,000 Lives
a	No auto-chronic identification.	97,969	113.453
b	Authorisation but in 2004 or 2006	116,070	134.415
c	Authorisation and/or claim used.	166,901	193.279
d	Authorisation or claim or NAPPI crosswalk	270,362	313.092
Preferred set finally chosen for REF Study 2005		**113,602**	**131.556**

The cream area in the graph shows the range of definitions of "chronic" by age across the four data sets. For comparison, the chronic rate by age for the other three administrators is also shown. The odd peak at early ages for the top boundary of the Administrator 4 range is due to unusually high identification of childhood asthma. The most extreme version of auth-chronic definition (data set "d") produced a clearly unacceptable pattern of chronic disease by age.

The range of patterns for the other three administrators gives some sense of the difference in risk factors across administrators. An unresolved issue is whether the different levels represent real differences in risk or only differences in clinical interpretation of "disease". Analysis by each disease gave more sense of what was highly unusual data as compared to "normal" variation. The final set chosen was determined by the four pricing actuaries considering the problems in each disease and drawing together common conclusions on acceptability.

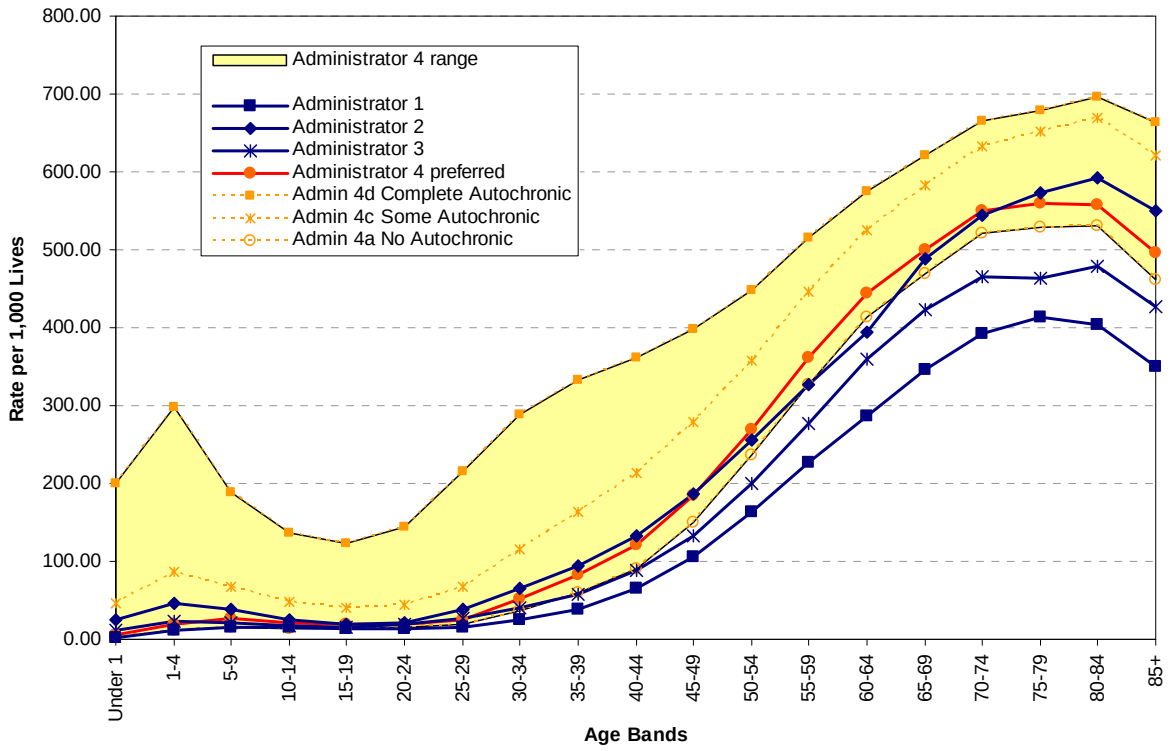


Figure 3: Impact of Autochronic Identification Processes on Total Chronic Conditions

The decision was that auto-chronic definitions using proxy diagnosis from medicines or ICD-10 codes derived from claims was not acceptable. The only chronic definition acceptable is where there is a granted authorisation for a CDL disease, even if the authorisation was found outside the applicable year. Many funds had been active in 2005 and 2006 to ensure that valid authorisations were obtained from healthcare providers and the problem of the authorisation being in the wrong year was expected to work its way out of the system. All other auto-chronic definitions / and or claims identification methods are no longer acceptable and this was incorporated in version 2.1 of the Verification Criteria, applicable retrospectively from 1 January 2007.

3.4 REF Study 2005 and learnings on disease patterns

The preliminary study for the REF formula was done using 2001 data at the then-largest administrator [4]. It was refined on the two largest administrators in the REF Study 2002, to be applicable in 2004 [5]. The tables were adapted for inflation and minor changes for 2005 and 2006 [12,13]. However, during that period the PMBs became more clearly defined, the CDL list was introduced and ICD-10 coding improved substantially. It was decided to perform a comprehensive study using 2005 data in order to produce the tables for 2007 and this is known as the REF Study 2005 [14].

The REF Study 2005 used data from the four largest administrators who provided services to 63.4% of the private health fund beneficiaries in the country. The data set in respect of calendar year 2005 contained 49.847 million member months of data or the equivalent of 4.153 million member years of data. The beneficiaries were classified into the REF risk factors (and combinations thereof) and the set provided prevalence as well as expenditure by type of service (in-hospital; medicine; and related visits and diagnostic tests). Two sets of data were extracted: the first used Version 2 of the Verification Criteria and was called the "Treated Patient Data set" or "TREATED"; the second set was extracted without the test for "treated patient" and was called the "Total Cases Data set" or "CASES". While this meant a doubling of the extractions, it provided a powerful tool to investigate the impact if more people in future fall within the definition of "treated patient".

The very large amount of data and the care taken to clean the data meant that patterns of disease were typically very smooth. Figure 4 shows the prevalence of Type 2 diabetes mellitus by age and gender. The data had been adjusted for multiple diseases (for example Type 1 and Type 2 diabetes together) and shows only those that meet the "treated patient" definition.

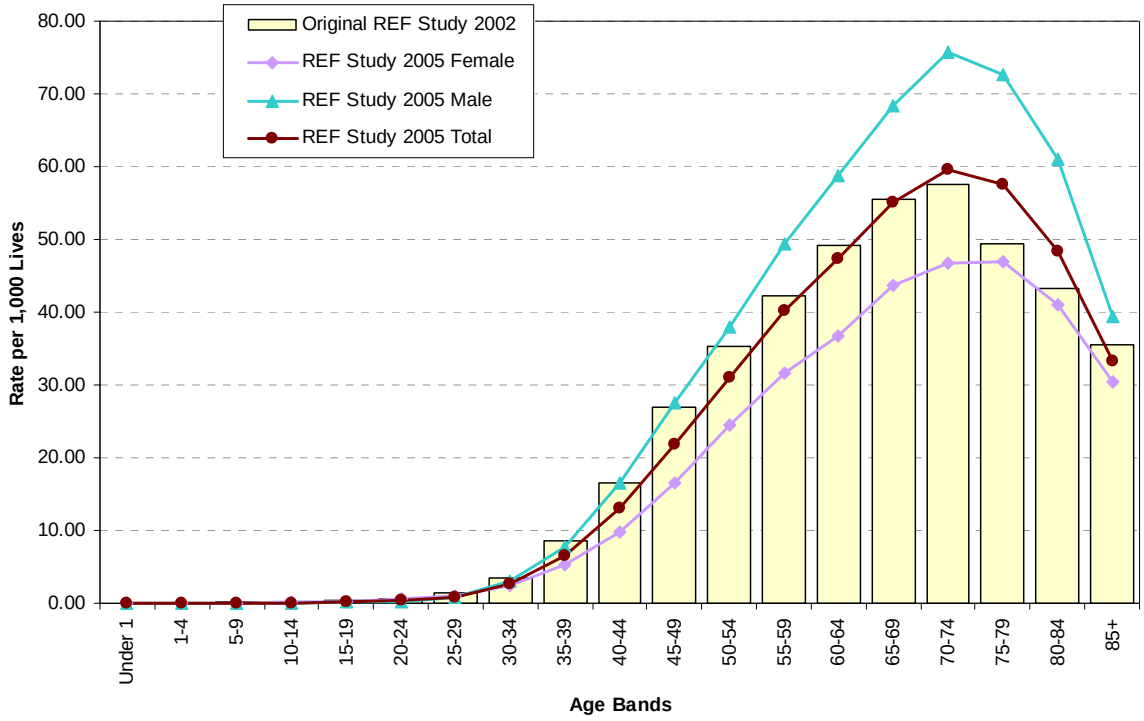


Figure 4: Prevalence of Diabetes Mellitus Type 2 "Treated Patients" by Gender

Each disease has its own unique pattern by age and gender which can be used to test data submitted by other administrators for reasonability. These patterns were also compared to the original study and found to be very close for most diseases. This was a useful finding in that the 2002 study occurred before there were incentives to inflate chronic disease and the effect of the Verification Criteria could be shown to produce similar results.

3.5 Risk factors for children under 1 year of age

During the 2005 study it was found that some of the outliers were for beneficiaries under one year old. The whole question of chronic disease diagnosis for Under 1s was discussed with a respected leading paediatrician. The REF risk factor diseases had previously also applied to Under 1s but the algorithms for the minimum benefit package were adult-based and did not necessarily apply to children. Particular problems were encountered with high numbers of Under 1s with asthma and epilepsy. However the paediatrician found that wheezing was being included as asthma and seizures as epilepsy, and expressed the opinion that "while some wheezers may go on to be asthmatic and the occasional fitter will become an epileptic, the majority will not. Small children get repeated viral infections and because their airways are narrow they wheeze easily. Many young children have a fit when they have an infection and associated high temperature." He concluded that "the bottom line is that I think you're being hoodwinked and will need additional evidence before you pay out for these alleged disease burdens".

More data would be needed to establish whether there was genuinely a high-risk Under 1 and it would include a history of very low birth-weight, prolonged ventilation/ICU stay, frequent hospital admissions, and the use of particular medications. REF does not collect risk factor information in this format at present.

After considering the number of cases and the clinical comments the decision was taken to default all Under 1 chronic cases to NON (i.e. no chronic disease) from January 2007. The cost of low birth-weight babies and occasional complications remains in the price for Under 1s which is over five times the amount reimbursed for the next age band of 1-4 years. There has been some pressure to include expensive Under 1 cases as a risk factor but this would become a retrospective factor rather than a prospective one as at present. The anti-competitive behaviour by local hospital groups and the aggressive expansion in recent years of neo-natal intensive care units might be exacerbated by adding high-cost neo-nates as a specific risk equalization factor.

3.6 Numbers diagnosed compared to numbers treated for disease

One of the most interesting findings from the REF Study 2005 was the number of people who are diagnosed with a chronic disease but who are not receiving treatment at the levels required for “treated patient” status. The criteria to qualify for “treated patient” status differ by disease but are typically receiving relevant medicine for two months out of every three month period (see Appendix C for an example).

Figure 5 illustrates the data available using one disease, diabetes mellitus Type 2, and shows how the numbers used in risk equalization are arrived at from the initial numbers diagnosed with the disease. The expected rates for each disease for the whole private insurance market are given in Appendix D.

The graph and table use the following definitions of disease:

- **CASES Prevalence**: all beneficiaries with diagnosis for the condition;
- **CASES Revised Prevalence**: after application of disease group rules;
- **CASES Count**: as used in REF Grids, with allocation to highest cost disease, but includes "chronic not verified" who do not meet "treated patient" criteria. Potential count if compliance improves.
- **TREATED Prevalence**: all "treated patients" for the condition [not on graph]
- **TREATED Revised Prevalence**: all "treated patients: after application of disease group rules. This is published as **Expected Prevalence of Chronic Disease** tables and is also shown in Figure 4.
- **TREATED Count**: "treated patients" with allocation to highest cost disease, as expected in REF Grids. Published as **Assumed REF Grid Count** table.

The two lines on

Figure 5 show the prevalence of disease and illustrate the gap between diagnosed prevalence and treated prevalence. The stacked bars show the extent to which disease is used by the risk equalization formula. The dark lower portion of the bar is the current REF count but this could increase by the shaded part if more people become compliant. The difference between prevalence and the REF Grid is due to the allocation of each person to only the highest cost disease.

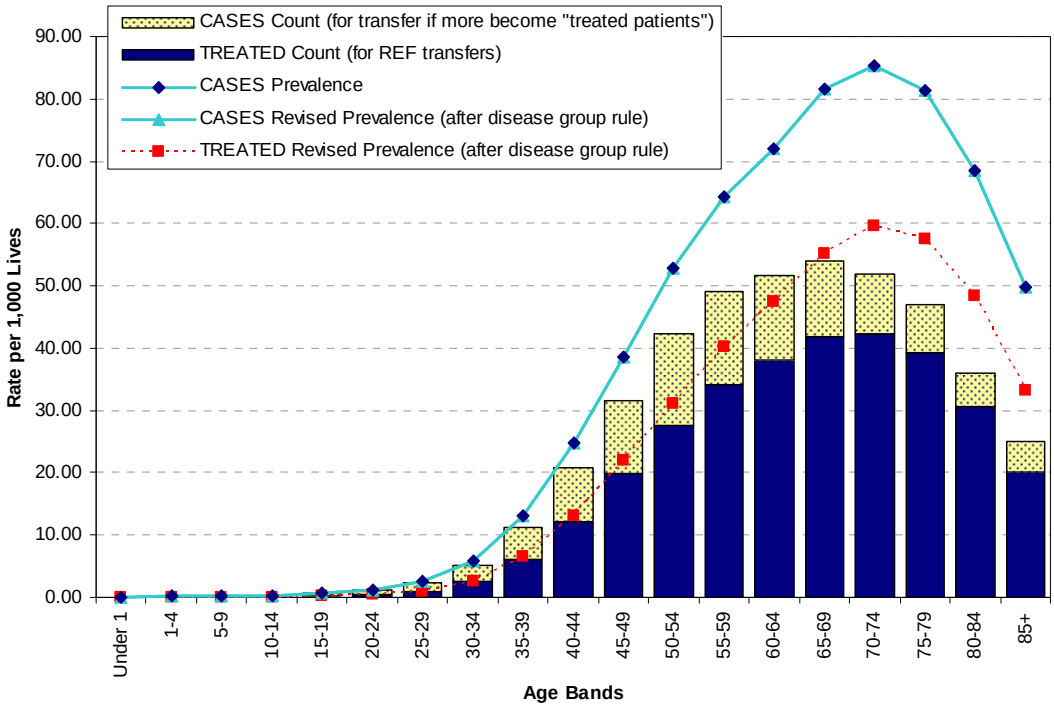


Figure 5: Comparison of Cases Diagnosed and Treated Patients for Diabetes Mellitus Type 2

In the graph CASES Prevalence and CASES Revised Prevalence after the disease group rule are shown to be the same. This is because the diabetes disease group rule defaults diabetes mellitus Type 1 to Type 2 if both could be argued from the claims evidence. In other diseases there can be substantial differences between the lines, particularly at older ages.

If more people becoming compliant on medicine, this has a large effect on the REF industry community rate[7] and the size of transfers between sickness funds. If the effect persists, it may be necessary to adjust the REF tables in the next annual cycle. For example, the value for risk equalization for a 40 year old with diabetes is R602.55 but if all people diagnosed become compliant the value falls 46.4% to R322.84. This occurs because those not meeting the "treated patient" definition have milder disease and are costing the fund less at present. The adjustment for additional medicine usage would need to be included but the extent of the reduction might still be of the order of at least one-third from current "treated patient" levels.

4. Discussion points and concerns

In South Africa there has been a steep learning curve about chronic disease as a risk factor during the shadow period. While data is being collected on chronic diseases, a final decision will only be made whether or not to include this as a risk equalization factor when going live. If the quality of disease data is deemed insufficient at that time, the decision could be to revert to a contribution table based on one or more of the following risk equalization factors: age, gender, a maternity event and/or a chronic disease marker.

This section contains issues to stimulate discussion at the RAN meeting in Dublin in March 2008. Other than the data problems there are also some wider principals that are continuously raised and discussed in South Africa.

4.1 Determining the "true" level of chronic disease

Figure 2 showed the experience of attempting to get to comparable levels of chronic disease identification. While the Verification Criteria and the concept of a "treated patient" are important to trying to standardise the definitions of disease, the implementation of the Criteria is not simple. Problems in comparability are caused by early, delayed or partial implementation of the Verification Criteria and this means that transfers between funds can not be accurately determined. During 2006 the industry community rates calculated by the regulator were flawed because all funds were used to calculate the rate, not only those with clean disease data. This can cause funds to have a false perception of the transfers that may occur in future and they may thus enter into mergers or take other actions based on poor information.

- A key issue for the industry in South Africa is whether we will be able to say that we have eliminated sufficient of the data-related errors and that what remains is the "true" level of chronic disease in the industry.

[7] The REF industry community rate is the average payment per life needed from the entire industry in order for risk equalization to be a zero-sum-game. The REF contribution table is published every year which contains the value for payments from REF for each combination of risk equalization factors. The REF industry community rate is derived by multiplying the value in the REF contribution table by the number of lives in each cell across the whole industry, then dividing by the total number of lives. The expected industry community rate is estimated for the year ahead but the actual REF industry community rate varies each month.

4.2 Incentives created by definition of chronic disease

In order to be counted as a chronic patient for the purposes of REF, a patient has to meet certain criteria. One of these criteria involves that certain medication must have been taken on a regular basis, usually in two out of the last three months. Proof of treatment is that the amount must have been paid from pooled funds for that number of treatment dates. This has created some perverse incentives:

- When financial transfers start under the REF, funds will have an incentive to make sure that chronic patients are identified and treated appropriately, as there will be a larger subsidy for such patients. Some funds that realise this are now paying their managed care organisations (MCOs) a fee to find these chronic patients that the MCOs should have been managing all along. Where this practice does take place, it is increasing the non-healthcare expenditure of funds.

- Many funds have also introduced postal delivery of chronic medicine. This often leads to medicine being delivered at a regular frequency irrespective of whether all the prior medicine has been taken. This introduces wastage into the system.
- Some patients who go on holiday for lengthy periods try to get their chronic medicine for the whole period before they go away. This leads to more than one script being dispensed in the same month and makes it difficult to meet the verification criteria. Some funds now refuse to allow more than one month of medication to be taken at a time, which is difficult for members.

4.3 Exclusion of wellness programmes and other forms of treatment

The definition of treatment has been developed using only allopathic[8] drugs. This has created a barrier to other forms of treatment:

- Funds are only rewarded for a chronic patient if they use medicine to treat the disease. This could prevent the introduction of wellness programmes and life-style modification where these are more appropriate. The REF formula makes it better to leave someone diseased and on treatment than to attempt to relieve the condition. This is not an issue with all diseases but for diseases like hypertension, hyperlipidaemia, diabetes mellitus Type 2 and child-hood asthma, life-style modification may often resolve the problem.

- Complementary and alternative medicine (CAM) is extensively regulated in South Africa with 11 modalities licensed by four professional boards[9]. If a patient is being successfully treated by a homeopath, for example, the person would not count as a "treated patient" for REF. The problem is not insurmountable if the doctors who developed the REF criteria can be persuaded to accept proof of treatment from their

[8] "Allopathic medicine" is commonly used to describe the health model that dominates the Western world. Other terms include "conventional medicine", "Western medicine" or "Western bio-medicine".

[9] Chiropractic and Osteopathy; Homeopathy, Naturopathy and Phytotherapy (Western herbal medicine); Ayurveda (Indian system of medicine), Traditional Chinese Medicine (including acupuncture) and Unani-Tibb (Islamic system of medicine); Therapeutic Aromatherapy, Reflexology and Massage.

registered CAM colleagues. The issue is one of medical politics rather than a design problem.

- Traditional medicine (TM) is used by an estimated 72% of the population in South Africa, although a very low proportion of current members of medical schemes. The legislation governing the licensing and training of practitioners has been passed but integration with private insurance funds is almost non-existent. Much work will be needed on how TM can be incorporated into a framework that currently demands ICD-10 coding and drugs manufactured by pharmaceutical companies.

4.4 Experience with multiple chronic disease in risk equalization formulae

In the current risk equalization formula, every patient is allocated to only one of the 26 chronic diseases. This REF Grid Count assumes that funds will allocate the person to the most expensive condition if multiple conditions are present. An additional amount is added where a patient is allocated to more than one chronic disease (after the application of the disease group rules).
The order of chronic diseases changes from time-to-time due to differences in the relative inflation between hospitals, medicines and related costs (visits and tests). If the disease order changes there can be substantial swings in the disease that is the most expensive (see Appendix E). This requires the systems at each administrator to be adapted at least every year when the new order of diseases is published.

The change in the relative "attractiveness" of diseases for reimbursement purposes may be a useful effect in making it more difficult for funds to predict where profits can be made from risk-selection.

The authors would like to discuss this but also explore the experience of others with regard to ways to adjust for chronic diseases:

- to divide the 26 chronic conditions into smaller groupings of disease (see Appendix D for the prevalence of each condition);
- to work on an additive model whereby each chronic disease or disease grouping is counted; or
- There may be other ways?

We look forward to a lively discussion.

Appendix A: South African Minimum Benefit Package

The Prescribed Minimum Benefits (PMBs) are defined in Annexure A to the Regulations made in terms of the Medical Schemes Act, No. 131 of 1998, as amended. PMBs must be provided for in full, with no financial limits and no co-payments. Pre-authorisation may be required for hospitalisation, formularies may be applied and delivery may be restricted to a designated service provider network. Involuntary treatment outside the network must still be fully covered. The PMBs consist of:

a. A list of some 270 **diagnosis-treatment pairs** (PMB-DTP). Introduced from 1 January 2000.

Code	Diagnosis	Treatment
900H	Open fracture/ dislocation of bones or joints	Reduction/relocation; medical and surgical management
31K	Hypoglycemic coma; hyperglycemia; diabetic ketoacidosis	Medical management
915E	Gangrene; severe atherosclerosis of arteries of extremities; diabetes mellitus with peripheral circulatory disease	Medical and surgical management including amputation

b. **Emergency medical conditions** (included in PMB-DTP). Clarified and in force from 1 January 2003.

c. Diagnosis, treatment and medication according to therapeutic algorithms for 25 defined chronic conditions, the **Chronic Disease List** (PMB-CDL). Introduced from 1 January 2004.

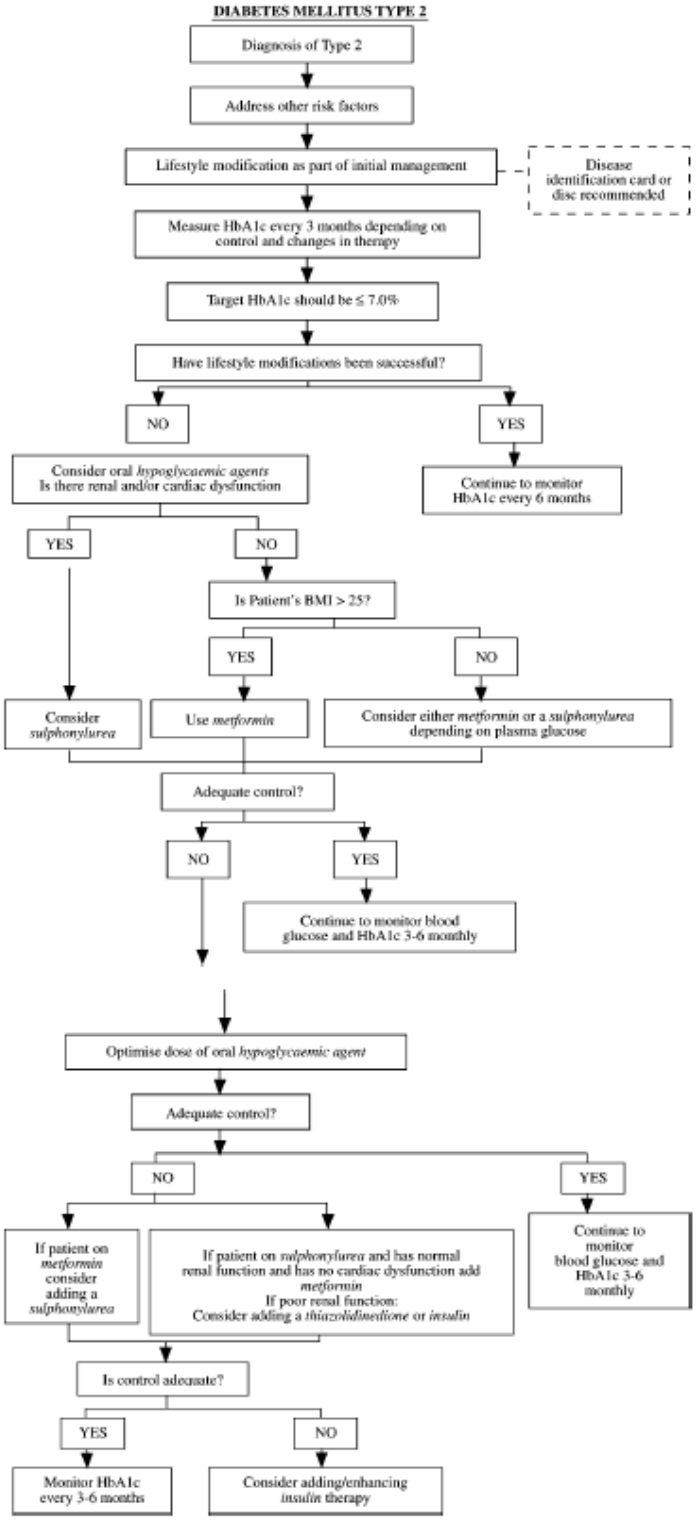
Chronic Disease List (CDL) Conditions	
Addison's Disease	Epilepsy
Asthma	Glaucoma
Bronchiectasis	Haemophilia
Bipolar Mood Disorder	Hyperlipidaemia
Cardiac failure	Hypertension
Cardiomyopathy	Hypothyroidism
Chronic Obs. Pulmonary Disease	Multiple Sclerosis
Chronic Renal Disease	Parkinson's Disease
Crohn's Disease	Rheumatoid Arthritis
Crohn's Disease	Schizophrenia
Diabetes Insipidus	Systemic LE
Diabetes Mellitus Type 1	Ulcerative Colitis
Diabetes Mellitus Type 2	

The CDL conditions are defined by ICD-10 codes. While the DTPs are published without ICD-10 codes, the applicable diagnosis codes are provided to funds by the Council for Medical Schemes. ICD-10 codes are mandatory on all claims from July 2005.

It is widely acknowledged that the PMBs are deficient. One of the deficiencies is that they do not include sufficient primary care but there has been no progress on defining a primary care package for inclusion in the PMBs.

Appendix B: Therapeutic Algorithm for Diabetes Mellitus Type 2

The extract below is from the Regulations in terms of the Medical Schemes Act. It forms the basis for minimum out-patient treatment for the condition.



Glossary:

- HbAlc – Glycosylated haemoglobin
- BMI – Body mass index

Applicable ICD 10 Coding:

- El I Non-insulin-dependent diabetes mellitus
  - E11.0 Non-insulin-dependent diabetes mellitus with coma
  - E11.1 Non-insulin-dependent diabetes mellitus with ketoacidosis
  - E11.2 Non-insulin-dependent diabetes mellitus with renal complications
  - E11.3 Non-insulin-dependent diabetes mellitus with ophthalmic complications
  - E11.4 Non-insulin-dependent diabetes mellitus with neurological complications
  - E11.5 Non-insulin-dependent diabetes mellltus with peripheral circulatory complications
  - E11.6 Non-insulin-dependent diabetes mellitus with other specified complications
  - E11.7 Non-insulin-dependent diabetes mellitus with multiple complications
  - E11.8 Non-insulin-dependent diabetes mellitus with unspecified complications
  - E11.9 Non-insulin-dependent diabetes mellitus without complications

- E12 Malnutrition-related diabetes mellitus
  - E12.0 Malnutrition-related diabetes mellitus with coma
  - E12.1 Malnutrition-related diabetes mellitus with ketoacidosis
  - E12.2 Malnutrition-related diabetes mellitus with renal complications
  - E12.3 Malnutrition-related diabetes mellitus with ophthalmic complications
  - E12.4 Malnutrition-related diabetes mellitus with neurological complications
  - E12.5 Malnutrition-related diabetes mellitus with peripheral circulatory complications
  - E12.6 Malnutrition-related diabetes mellitus with other specified complications
  - E12.7 Malnutrition-related diabetes mellitus with multiple complications
  - E12.8 Malnutrition-related diabetes mellitus with unspecified complications
  - E12.9 Malnutrition-related diabetes mellitus without complications
- 024 Diabetes mellitus in pregnancy
  - 024.1 Pre-existing diabetes mellitus, non-insulin-dependent
  - 024.2 Pre-existing malnutrition-related diabetes mellitus
  - 024.3 Pre-existing diabetes metlitus, unspecified

Note:

1. Medical management reasonably necessary for the delivery of treatment described in this algorithm is included within this benefit, subject to the application of managed health care interventions by the relevant medical scheme.
2. To the extent that a medical scheme applies managed health care interventions in respect of this benefit, for example clinical protocols for diagnostic procedures or medical management, such interventions must—
   a. not be inconsistent with this algorithm;
   b. be developed on the basis of evidence-based medicine, taking into account considerations of cost-effectiveness and affordability; and
   c. comply with all other applicable regulations made in terms of the Medical Schemes Act, 131 of 1998.
3. This algorithm may not necessarily always be clinically appropriate for the treatment of children. If this is the case, alternative paediatric clinical management is included within this benefit if it is supported by evidence-based medicine, taking into account considerations of cost-effectiveness and affordability.

Appendix C: Verification Criteria for Diabetes Mellitus Type 1 and 2

The extract below is from the REF Verification Criteria v3, applicable from 1 January 2008. It forms the basis for identifying diagnosed and treated patients with the disease, for the purposes of applying the risk equalization formula.

Applicable to cases reported from 1 January 2008

Table 12: Diabetes Mellitus (Type 1 and 2)

Diabetes Mellitus (Type 1 and 2)

Note:

- *For REF purposes, Type 1 and Type 2 diabetes cannot occur concurrently.*
- *Evidence of use of oral euglycaemic medicines automatically leads to the classification of a diabetic case as Type 2.*
- *Where there is only insulin use (ATC A10A), the doctor's diagnosis (based on the ICD10 codes below) of Type 1 versus Type 2 must be accepted*
- *Cases meeting the proof of treatment criteria must be counted in accordance with the classification as type 1 or type 2 in accordance with the rules below, regardless of the type for which authorisation was given.*

Diagnosis-related information							*Proof of Treatment*
Provider code of the diagnosing provider	AND	ICD10 Codes (Any of the following)		AND IF	Evidence of use of oral hypoglycaemic or euglycaemic agents. This includes any product in the A10B ATC category:	AND	Evidence of payment of claims for any product included in the ATC categories below, for services / treatment that was provided in two different calendar months in the three calendar months preceding the current month:
		E10.0	E11.9				A10B
		E10.1	E12.0		**OR**		**OR**
		E10.2	E12.1		Any ICD10 code indicative of Non-Insulin Dependent Diabetes:		Evidence of payment of claims for any product included in the ATC categories below, for services / treatment that was provided in one calendar month in the three calendar months preceding the current month:
		E10.3	E12.2		E11.0, E11.1, E11.2, E11.3, E11.4, E11.5, E11.6, E11.7, E11.8, E11.9, O24.1		
		E10.4	E12.3		**THEN**		A10A
		E10.5	E12.4		Classify as Type 2 diabetes		
		E10.6	E12.5		**ELSE**		
		E10.7	E12.6		Classify as Type 1 Diabetes		
		E10.8	E12.7				
		E10.9	E12.8				
		E11.0	E12.9				
		E11.1	O24.0				
		E11.2	O24.1				
		E11.3	O24.2				
		E11.4	O24.3				
		E11.5	O24.4				
		E11.6	O24.9				
		E11.7					
		E11.8					
Any registered medical practitioner							

ATC Code Descriptions for Diabetes Mellitus:

A10A	Insulins and analogues
A10B	Oral blood glucose lowering drugs

Appendix D: Expected Rate per 1,000 Lives using Different Definitions of "Disease"

Code	Disease / Condition	Expected Rate per 1,000 Lives in 2007			
		Diagnosed with Chronic Disease [2]	Treated Patient Prevalence [3]	Treated Patient for Risk Adjustment [4]	Maximum for Risk Adjustment if more become "Treated Patients" [5]
NON	No CDL disease	814.645	886.395	886.395	814.645
Chronic	All CDL disease and HIV	292.065	153.844	113.605	185.357
ADS	Addison's Disease	0.095	0.055	0.031	0.040
AST	Asthma	33.942	16.063	14.673	27.111
BCE	Bronchiectasis	0.413	0.059	0.051	0.298
BMD	Bipolar Mood Disorder	2.045	0.574	0.567	1.965
CHF	Cardiac failure	no longer collected, merged with CMY			
CMY	Cardiomyopathy	8.347	5.396	4.926	7.046
COP	Chronic Obs. Pulmonary Disease	4.816	2.692	2.672	4.668
CRF	Chronic Renal Disease	1.779	0.257	0.257	1.779
CSD	Crohn's Disease	0.452	0.176	0.174	0.437
DBI	Diabetes Insipidus	0.102	0.013	0.012	0.066
DM1	Diabetes Mellitus Type 1	5.394	2.526	2.503	5.267
DM2	Diabetes Mellitus Type 2	20.429	12.364	10.284	15.346
DYS	Dysrhythmias	3.818	1.380	1.292	2.014
EPL	Epilepsy	7.817	3.560	3.274	6.495
GLC	Glaucoma	4.310	1.932	1.230	2.313
HAE	Haemophilia	0.028	0.014	0.014	0.028
HYL	Hyperlipidaemia	40.136	24.134	15.391	20.298
HYP	Hypertension	100.975	54.791	35.842	50.302
IBD	Ulcerative Colitis	1.314	0.301	0.255	0.981
IHD	Coronary Artery Disease	17.130	6.417	6.084	13.295
MSS	Multiple Sclerosis	0.256	0.130	0.130	0.255
PAR	Parkinson's Disease	1.178	0.624	0.558	0.959
RHA	Rheumatoid Arthritis	5.245	2.400	1.998	3.838
SCZ	Schizophrenia	0.702	0.288	0.248	0.502
SLE	Systemic LE	0.445	0.179	0.173	0.410
TDH	Hypothyroidism	15.473	10.687	4.215	5.066
HIV	HIV/AIDS	15.424	6.832	6.751	14.578
CC2	Two simultaneous conditions	42.191	26.010	26.010	45.903
CC3	Three simultaneous conditions	17.653	5.895	5.895	14.109
CC4	Four or more simultaneous conditions	8.536	0.781	0.781	3.026
MAT	Maternity event in period [1]	2.201	2.201	2.201	2.201

[1] Quoted monthly per 1,000 Female lives

[2] **CASES Prevalence**, i.e. number with diagnosis

[3] **TREATED Revised Prevalence**, using disease group rules and "Treated Patient" criteria

[4] **TREATED Count**, with multiple disease allocated to only one (the most expensive) disease

[5] **CASES Count**, i.e. impact on risk adjustment if all diagnosed with disease meet verification as "Treated Patients".

Appendix E: Ranking of Diseases in Published REF Contribution Tables

The table below shows the rankling of diseases, from most expensive to least expensive, in each of the REF Contribution Tables published since 2004. In 2007 there were two tables generated, one without gender and one with gender as a risk factor.

REFCT2004			REFCT2005			REFCT2006			REFCT2007			REFCT2007 Gender		
Disease	Amount above NON	Ranking	Disease	Amount above NON	Ranking	Disease	Amount above NON	Ranking	Disease	Amount above NON	Ranking	Disease	Amount above NON	Ranking
HAE	10018.77	1	HAE	6307.2	1	HAE	6702.98	1	CRF	15899.13	1	CRF	15886.07	1
CRF	5350.59	2	CRF	5607.69	2	CRF	6092.36	2	HAE	10727.77	2	HAE	10727.77	2
CSD	1635.2	3	CSD	1646.52	3	MSS	4596.03	3	MSS	8925.82	3	MSS	8924.99	3
HIV	1471.59	4	CMY	1418.24	4	CSD	1746.88	4	DM1	1418.31	4	DM1	1411.20	4
CMY	1370.97	5	HIV	1326.09	5	HIV	1434.75	5	COP	1371.42	5	COP	1356.44	5
DBI	1252.51	6	CHF	1200.4	6	CHF	1328.36	6	SLE	1254.40	6	SLE	1261.61	6
MSS	1238.3	7	DBI	1121.87	7	CMY	1328.36	6	CSD	1206.23	7	CSD	1205.70	7
CHF	1155.81	8	MSS	1109.13	8	DBI	1099.81	8	CHF	1179.94	8	BMD	1178.97	8
DM1	981.19	9	DM1	924.06	9	BMD	954.29	9	CMY	1179.94	8	CHF	1173.80	9
BMD	953.6	10	BMD	922.52	10	IBD	953.87	10	BMD	1178.43	10	CMY	1173.80	9
IBD	940.7	11	IBD	917.34	11	DM1	938.88	11	HIV	997.33	11	HIV	995.29	11
IHD	860.85	12	IHD	876.72	12	IHD	936.6	12	PAR	889.09	12	PAR	876.89	12
EPL	832.72	13	COP	815.48	13	COP	856.28	13	IHD	855.68	13	IHD	837.89	13
PAR	825.64	14	EPL	815.1	14	EPL	849.62	14	DBI	833.64	14	DBI	821.29	14
COP	823.5	15	PAR	739.52	15	PAR	724.98	15	EPL	708.16	15	EPL	705.92	15
SCZ	759.31	16	SCZ	680.11	16	SCZ	666.74	16	SCZ	639.44	16	SCZ	639.45	16
DYS	462.31	17	DYS	475.25	17	DYS	510.54	17	DYS	606.18	17	DYS	595.00	17
AST	404.55	18	AST	379.09	18	AST	383.86	18	BCE	463.70	18	BCE	464.97	18
HYL	359.45	19	HYL	321.96	19	HYL	315.63	19	DM2	447.83	19	DM2	436.33	19
RHA	306.61	20	RHA	274.63	20	RHA	269.23	20	IBD	426.49	20	IBD	426.50	20
HYP	282.13	21	HYP	260.69	21	HYP	261.38	21	RHA	366.03	21	RHA	377.01	21
SLE	251.37	22	SLE	225.15	22	SLE	220.73	22	AST	303.90	22	AST	304.73	22
ADS	249.24	23	ADS	223.25	23	ADS	218.86	23	HYL	225.17	23	HYL	225.02	23
BCE	242.9	24	BCE	217.56	24	BCE	213.28	24	GLC	223.88	24	GLC	224.27	24
DM2	239.2	25	DM2	214.25	25	DM2	210.04	25	HYP	169.64	25	HYP	170.70	25
GLC	205.09	26	GLC	183.7	26	GLC	180.08	26	ADS	147.35	26	ADS	147.35	26
TDH	49.82	27	TDH	44.63	27	TDH	43.75	27	TDH	83.24	27	TDH	84.77	27

The changes from 2004 to 2006 were due to differential inflation in the components of the cost: in-hospital; medicine; and related costs (visits and tests). The therapeutic algorithm for multiple sclerosis was changed to include expensive treatment with beta-interferon and this was included as a change in the 2006 table. The major revisions to the rankings from 2006 to 2007 were the result of the completely revised REF Study 2005 which had more detailed expenditure data and much better identification of chronic disease than the first study in 2002.

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