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Cost-effective Delivery of Specialist Medical Services to the St. Helena Population - Review of Options - Draft Recommendations

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1. BRIEF SITUATION ANALYSIS ON ST HELENA HEALTH CARE – BACKGROUND AND POTENTIAL EXPLANATIONS

The development of total referral cost from calendar year 2000 to 2006[1] can be seen from figure 1 (annex 1). Though the number of projected referrals for 2006, see below, actually far exceeds the number actually reported in 2005 (106 to 57) the projected actual cost is below the cost level found in 2005. The reason for this is that the unit cost per diagnosis applied for the projection are averages for the period 2000-2005, and these average unit cost are around half the unit cost found in 2005 that were unusually high, indicating some extremely high cost referrals cases for this year and a generally upward going tendency in all diagnosis related unit cost for 2005. If 2005 unit cost were applied to the projection of cost for 2006 the total cost would far exceed the total cost level found in 2005, about £ 1.1 million. All in all the picture of the total cost shows two distinct patterns; a fairly steady period from 2000 to 2004 characterised by a low cost level followed by two years with significant and unprecedented increases in cost. Depending on the underlying assumptions attached to the cost projection for 2006 total cost has increased between factor 4 and factor 7 from the stable low cost period (2000-2004) to the high cost years 2005 and 2006.

Figure 2 (annex 1) exhibits ranking of the diagnoses with highest cost. Cancer is the most costly diagnose (45% of total cost) followed by cardiology (13%), spinal (10%), urology (8%) and orthopaedic diagnoses (8%). The top 5 diagnoses comprise thereby far the largest share (84%) of total referral cost aggregated for the entire 6-year period.

Total number of referrals shows a similar trend as total cost. Figure 3 in annex 1 shows the development of total number of referrals distributed on the top 5 diagnoses. As with total cost two distinct periods in the period 2000 -2006 emerge: A period in the years 2000-04 with average number of total referrals stabilised around 30 annual referrals followed by a 90% increase in 2005 to 57 referred patients. Taking the projection for 2006 into consideration (which includes a simple straight line projection of the 53 actual reported referrals in the first half year of 2006) the percentage increase in numbers referred between the two sub periods varies between a minimum of 90% to a more realistic 250% in which case the latter will occur if the referral pattern for last half year of 2006 continues with same intensity as happened in the first half of 2006. Going to specific diagnoses cancer is the diagnose most often referred in the period 2000-05 (26% or 55 referrals out of total 208). Cardiology is the second largest diagnose referred through 2000-05 (14%), however with a significant increase in the first two quarters of 2006[2] compared with an annual average of 5 cardiology cases in the period 2000-05. Spinal, urology and orthopaedic related referrals make up respectively 24, 21 and 20 cases. All in all these top 5 diagnoses comprise between 50 and 80% of total referrals during the period 2000-06.
Figure 4 in annex 1 displays the problems of planning and controlling the referral budget experienced in the financial years 2000/01 – 2005/06. Two years came out with underspending (2001/02 and 2002/2003) and 4 years displayed overspending with total referral expenditures[3] significantly overspending in the latter period. During the year 2000/01 there was quite a number

[1] 2006 is a projection of all referrals actually reported till end of second quarter (SMO 2006). The projection of total cost for all 4 quarters of 2006 relies on three components: 1) The actual reported cases till end of 2nd quarter which includes indication of diagnosis but are without implied cost; 2) attached average cost to referral diagnoses actually reported (simple average from 2000 to 2005) up till end of second quarter; 3) and a simple straight line projection of the cost found in the first 2 quarters to the last two quarters of 2006. The latter is due to the fact that there has been found no seasonality in the referral pattern during the period 2000 -2005 (Sunners 2006).

[2] 15 cases registered in Q1 and Q2 probably due to acquisition of a ultrasound diagnostic device

[3] Expenditure and budget are encompassing total cost: cost of treatment, subsistence, transport and liaison officer salary.

of people needing eye surgery and therefore referred. In the following years a retinal camera was acquired and most of the eye surgery was done on island by the visiting ophthalmic surgeon. The overspending significantly began in 2004/5 and was mainly due the increase in charges as it was at that time that SA medical/health centres made their name in the world of medicine[4]. Also the fluctuation of the Rand has been regarded as contributing factor to the implied uncertainties for SHG planners in budgeting and controlling referral expenditures. And this uncertainty has increased over the past five years.

Regarding Tristan da Cunha, the medical officer reports, that from the last two years they have experienced under spending on the referral budget: in each year GBP£ 40,000 was budgeted however only GBP 30,000 was spent. However the island administrator expects increases in referral cost due to ageing in the coming years.

One potential explanation for the experienced cost increase from 2005 and onwards in St Helena could be increase in unit cost for diagnosis related referrals. Figure 5 shows that the average cost for the top 5 diagnoses has fluctuated significantly during the period 2000-05. However, in the latest year (2005) for which unit cost can be calculated, notably increases can be observed for all 5 big diagnose related referrals. Except for cardiology, unit costs are found to be peaking in 2005 compared to all previous years, implying an average unit cost for all referrals on £ 12,540 which is nearly three times the average unit cost of total referrals in 2004 and twice as much as average for the entire period observed (£ 5,745).

Figure 6 (annex 1) shows the observed average age and estimated trend in age for total referrals. The curves exhibit a clear upward going trend with average referral age increasing steadily and with some fluctuations from 35.3 years in 2000 to estimated 56.1 years in 2006[5].

2. DEMOGRAPHIC OUTLOOK

The St Helena population has fluctuated significantly during the recent years. Uninhabited in 1502, St Helena reached a maximum population of 9,805 in 1901 and declined in 1911 to 3,520. In the past fifty years population figures have increased and decreased: they rose between 1956 and 1987 from 4,642 to 5,644, and more recently have fallen to around 4,000 (Muir 2006).

Table 1 Population projection 2003 - 2048

Year	Total population	% aged under 15	% aged 60 and over	Average annual growth rate in five year period
2003	4,100	21	19	-
2008	4,050	17	22	-0.25
2013	4,000	14	24	-0.30
2018	3,900	14	26	-0.29
2023	3,850	15	28	-0.37
2028	3,750	15	28	-0.59
2033	3,600	15	28	-0.74
2038	3,450	14	26	-0.83
2043	3,300	13	27	-0.87

[4] Information from CAHSSO
[5] Based on the "open data" for referrals, 2 first quarters and some for 3rd quarter 2006 (SMO 2006).

2048	3,200	13	28	-0.81

Source: Muir 2006

Table 1 shows the projected population under the simple assumption of fertility and mortality constant at 2003 levels with no migration. This is not a projection associated with any of the access options; it is a hypothetical exercise designed to illustrate the potential for ageing and decline in numbers. It shows clearly that simply stopping outward migration would not be enough to prevent a continued decline in population numbers. The existing age structure coupled with continued below replacement fertility would cause the population to decline and to age".[6]

Another projection predicts that by 2010 there will be 1,457 people over 60, or 27% of the resident population, with 426 over 70 years. The rise in numbers and proportion of elderly, with associated higher levels of chronic disease and disability, is exerting more pressures on staff time and costs.

Health services are managed within the constraints of the budget as appropriated annually by the Legislative Council. The Financial Secretary must approve expenditure over and above this. The table below shows the level of recurrent budget funding allocated to PHD within recent years.

Table 2 Development in health care budget and expenditures 1993/94 to 2002/03

	Total SHG Recurrent Estimates	PHD Original Estimates	PHD Budget as % of total	PHD Actual Expenditure
1993/94	9,073,742	1,009,000	11.1	1,154,675
1994/95	9,433,530	1,076,043	11.4	1,361,001
1995/96	9,581,700	1,228,619	12.8	1,362,557
1996/97	9,403,979	1,414,390	15.0	1,484,093
1997/98	10,035,310	1,486,650	14.8	1,542,937
1998/99	10,123,750	1,612,260	15.9	1,666,082
1999/00	10,172,450	1,651,040	16.2	1,855,557
2000/01	10,929,590	1,737,710	15.9	2,050,830
2001/02	10,590,580	1,954,450	18.5	
2002/03	11,246,670	2,078,190	18.5	

Source: HL2 –program memorandum 2002

As can be seen from table 2 PHD actual expenditures has grown significantly (77%) in the 10-year period from 1993/4 to 2002/03 and with over spend according to budget through all years, in 2000/01 with app 20 %. Likewise, PHD budget as percentage of total has increased from around 11% to twice this share (around 19%) in 2002/03 indicating a higher financial burden on total public expenditures. Cost recovery constitutes only an insignificant share of total revenues. Free treatment is given to children up to 15 years old and to any person receiving social service support. Everyone else must pay the set charge, though payment of bills due is not always.

With total expenditure of £781,600 in 2002/03 Health Link II programme constituted app. 40% out of total approved budget. For the period 2002/03 -2007/08 total cost of the HL2 Programme is up to £5,470,000 development aid (DFID) plus a SHG contribution of £557,300 implying that DFID contributes with around 90% finance of total program expenditures.

As can be seen from figure 7 in annex 1 per capita expenditure in total health care in 2000/01 was app. US$ 950 which is nearly 50% of the level spent on health care in the UK (US$ 1,837 in 2001). In Europe St Helena health care spending compares favourable with Eastern and Central

[6] Muir 2006 cited from Atkins, 2004 Appendix B: 4.19

European countries like Slovenia (US$ 889), Czech Republic (US$ 408), Poland (US$ 292) and South Africa (US$ 216).

However, with GNP per capita levels between US$2,500 (PPP) and US$ 3,900[7] St Helena income level is about 10 times lower than UK (US$ 30,100)[8]. Saint Helena also compares unfavourable with other UKOTS and South Africa as indicated in figure 8 (annex 1). For example Saint Helena generates less than one-third of the income level made in Anguilla.

According to outcome indicators, life expectancy in St Helena is comparable to a number of middle income countries such as Panama, Jamaica, Sri Lanka and higher than Saudi Arabia Thailand, Mauritius and South Africa, and only 3- 3.5 years less than the United Kingdom and the United States of America where per capita income is considerably higher (Owen 2003). Infant mortality is a significant and widely applied outcome indicator for quality and efficiency of health care services Table 3 indicates that a major achievement in this area has been accomplished in St Helena health care: From 1981 IMR has declined from 44.7 to 3.1 in 2003 indicating a development from a level comparable to many developing countries to IMR levels only comparable to the most developed countries in the world[9].

Table 3

Infant Mortality Rate (IMR)[10]	
1981	44.7
1982	37.6
1983	39.4
1984	32.4
1985	32.6
1986	24.3
1987	25.6
1988	19.6
1989	26.8
1990	28.1
1991	22.1
1992	23.6
1993	21.4
1994	17.5
1995	17.2
1996	17.9
1997	12.4
1998	16.5
1999	10.1
2000	3.6
2001	3.9

[7] CIA World Fact book 2006, https://www.cia.gov/cia/publications/factbook/geos/sh.html and SH Statistical Yearbook 2000.
[8] St Helena belongs to the World Bank classification group of *lower to upper middle income countries* .The WB classification groups are: low income, $875 or less; lower middle income, $876–3,465; upper middle income, $3,466–10,725; and high income, $10,726 or more. See www.worldbank.org/data/country/class/classgroups.htm.
[9] Cf. http://www.who.int/child-adolescent-health/OVERVIEW/CHILD_HEALTH/Mortality_Rates_03.pdf
[10] Rate per 1,000 live births, five year moving average

2002	4.3
2003	3.1

Source: Muir 2006

A poverty assessment on St. Helena[11] identified that no one faces absolute poverty. Income distribution on the Island shows relatively low levels of income inequality with the highest salary of the local government official being 4.6 times that of the lowest paid person in full-time employment.

Summarising: According to its status as a lower to upper middle economy St Helena is characterised by a comparatively high spent on health care measured per capita. However, according to outcome significant achievements in public health has been accomplished; not least the decrease in IMR provided from 1981 till today that indicates high efficiency and good quality of primary health care services provided in this period. Without the support from DFID it is hardly possible that St Helena could achieve the expenditure level experienced in recent years which therefore also questions whether the public health achievements could have been accomplished without the UK aid and support. If the DFID support were subtracted a more sustainable level of the health care budget would be about 50% of the current volume implying a cut back on several activities and services provided today.

3. SUMMARY OF REVIEW ON LITERATURE ON COST DRIVERS IN HEALTH CARE EXPENDITURE

- Results of empirical investigations differ whether demographic factors and most notably ageing has significant influence on observed increases in health care expenditures. Some investigations indicate that demographic factors are important and that especially the age group 65 – 74 years is an important factor in explaining increased health care expenditures in 25 European countries. However, the age group of 75+ plays an insignificant role (Christiansen et al 2005).

- In a European Union review of the future ageing societies of Europe and its economic consequences it is anticipated that demographic factors alone will lead to increases in public expenditures on health care in the magnitude of 1.5 and 4 percent of GDP in the period up to 2050 (Economic Policy Committee 2003).

- Others claim that demographic factors plays a minor role and that especially increased coverage of public provision of health care or insurance; increased demand/consumption of health care in line with increased prosperity, and supply-side factors such as the increased use of new an more expensive technology; and high medical price inflation are important predictors of rise in current and future health care expenditures (Oxley et al 1995).

- Also a recent report from the American RAND report found that current models projecting health care expenditures seems to assume that health status is a static condition. “However, studies of particular diseases find that mortality gains follow from lifestyle changes, primary and secondary disease prevention, and dramatic improvements in treatment. These same factors can result in postponement of disease, disability and proximity to death, i.e., a compression of morbidity” (Goldman et al 2004).

[11] Development and Economic Planning Department, SHG, 1999/2000

4. SUMMARY OF BRIEF SITUATION ANALYSIS OF ST HELENA HEALTH CARE

- After a steady period (2000 – 2004) total referral cost has suddenly increased by at least 4 times since 2005. The projection of total referral cost for 2006 (based on the referral pattern for the first 2 quarters) indicates that the high cost scenario from 2005 continues (and in all probability even exceeds this cost level - in 2006.

- Total cost distributed on main diagnoses shows that 5 diagnoses comprise over 80% of total referral cost for the entire period 2000-05 and cancer is far the most costly referral diagnosis comprising nearly half (45%) of all referral cost in the 6-year period.

- According to number cancer is the most frequent reason for referral (26% out of total referrals) from 2000-05. Cardiology is the second most frequently referred diagnosis (14%). In 2006 cardiology is projected to be the most frequent referral diagnosis constituting nearly 30% of total referrals that are projected to reach a peak of 106 annual referrals. This number is to be compared with an annual total average of 35 referrals implying that 2006 will exceed the annual average three times.

- Average unit cost per referral (all diagnoses) shows that between 2000 and 2004 unit cost has been fluctuating around a level of £ 4,000 GBP. In 2005 unit cost makes a significant increase (by a factor 3) to an average above £ 12,000 GBP. All diagnoses show increased unit cost for 2005, however cancer referrals is the main cost driver with unit cost increasing from an average level around £ 6000 GBP to £ 20,000 GBP (a three times increase).

- Average age for the total referrals has gone up by a steady trend during the period 2000-06. With an average referral age of 35 years in 2000 trend in average age has increased to a peak in 2006 of 56 years estimated as an average of all 58 reported referrals mainly from the first 2 quarters.

- Population on St Helena has fluctuated significantly during the recent years. Population figures rose between 1956 and 1987 from 4,642 to 5,644. Currently population is around 4,000 with 861 under age of 15 years and 779 aged 60 and over. Population projections indicate significant potential for further population decline and ageing. In 2010 it is estimated that out of total resident population 1,457 people will be over 60 years of age (27% of total pop.) with 426 over 70 years.

- Indicated by trend in IMR island health care system have a relative high quality and have effectively improved public health on island during the last 20 years. IMR has dropped from a 1981 level of 44.7 (comparable to several developing countries) to a 2003 -level of 3.1 only found in most developed countries in the world. This achievement has come about by significant UK support to the health sector, latest via establishment of the Health Link II programme. The UK support to SH total health care expenditures implies that St Helena spends comparatively more on health care than it's general income level ascribes to.

4.1. Option 1: Increase diagnostic and therapeutic equipment on island.

As mentioned above supply side factors are in some investigations found to be significant cost drivers. Increased use of new and more advanced technology is among the factors found most important not least due to the improvements of diagnostic quality (Oxley et al 1995). Especially scanners (MR, CT and ultrasound) are today widely acknowledged as significant technical improvements in the potential array of diagnostic equipment found in modern health care today[12]. On the other hand, acquisition of new technology should be carefully elaborated according to potential use (intensity and expected future demand) before any procurement decision in order to get best value of money and to avoid costly sub-utilization. Cost analysis can be a supplementary guidance in connection with decision making on procurement but should ideally be accompanied by other concerns to make the decision as inclusive and encompassing as possible. The following examples on cost analysis of various types of equipment therefore takes a specific focus that need to be included as one of the inputs required for comprehensive decision making but should not stand alone.

Currently the following *diagnostic equipment* of importance for referrals are reported as available on the island: A portable x-ray machine; a Siemens ultrasound equipment and a retinal camera. The x-ray is reported to be "not very effective when it comes to spinal x-rays. We waste on repeat x-rays and the accuracy of diagnosis is also in question". The ultrasound device was purchased in 2006 and is suitable for cardiac ultrasounds. When the retinal camera was acquired "there were quite a number of people needing eye surgery - people with diabetes…. and most of the eye surgery was done on island by the visiting ophthalmic surgeon[13] ".

Figure 9 (annex 1) exhibits number of cardiology related referrals in the period 2000-06. The development in cardiology referrals indicates the potential effect on referrals due to improvements in diagnostic equipment. In this case the acquisition of an ultrasound monitor combined with a visiting cardiologist: More than a three times increase in cardiology related referrals from 2005 to 2006.

Around 20 patients are annually referred overseas mainly to Cape Town for scans. Of these 20 patients, approx. 50% return without any treatment (either nothing was wrong or not treatable). In order to increase the diagnostic capacity in island and thereby save the cost of patients referred due to poor island diagnostics, the CMO therefore suggested acquirement of a CT scanner.

New generation CT scanners cost between £770,000 and £ 850,000 excluding tax, freight and insurance[14]. A used version can be purchased for price levels between £270,000 and £360,000 depending on age, standard and model. To this must be added necessary service contracts in order to maintain adequate function of the scanner. These optional service contracts depends of desired preventive service frequency (up to 4 times a year) and inclusion of remote service back-up (phone/Internet service provision related to current operational issues). The remote service component is found indispensable for in island operation of the equipment and is included in costing for all service contract packages included cost scenario examples. Staff required for operation of a CT scanner includes preferably a full time radiologist and as minimum an x-ray trained nurse. These professionals are not available on island and should therefore optimally be recruited additional to the current Healthlink 2 staff. Finally, resident/long term key staff needs training in simple operation of the scanner and will then be able - as a sub-optimal solution - be able to operate the scanner.

[12] Cf. www.impactscan.org

[13] Information from CAHSSO

[14] All technical specifications on CT scanners are provided by contact with Jesper Soerensen, medico engineer, Skejby Hospital, Denmark.

Table 4 provides an overview of the cost implied for three options:

1. CT scanner option: *A comprehensive package*: including procurement of newest generation scanner, the most comprehensive service and maintenance package, training of resident staff (1 MD, 2 times overseas) and recruitment of one long term resident radiologist.

2. CT scanner option: *A medium solution package:* Including procurement of used CT (good standard), medium service and maintenance package, training of resident staff (1 MD, 2 times overseas), recruitment of one long term resident x-ray nurse.

3. CT scanner option: *A minimal solution package*: including procurement of used CT scanner (minimum standard), cheapest service contract available, training of resident staff (1 MD, 2 times overseas), and 2 times 20 days visit package by x-ray trained nurse)

Table 4 Start-up, recurrent and total annual cost (annualised) related to procurement and operation of CT scanner.

CT-scanner scenarios	**Short term cost** (procurement of CT scanner and training)[15]	**Medium term cost/ annual recurrent cost** (service contract and required staff)	**Total annual cost** during a 5 and 10 year period[16]
Comprehensive option	£ 784,231	£118,364	£275,210 / £196,787
Medium option	£376,991	£71,362	£146,760 / £109,061
Minimum option	£286,493	£46,860	£104,158 / £75,509

Source: Own estimations based on information required from the Central Procurement Unit, Skejby Hospital, Denmark.

Table 5 Breakeven analysis: No of eligible CT scanning referrals required (breakeven) for making a CT scanner investment paying over 5 and 10 year period and cost of sub-utilisation according to current demand profile.

CT-scanner scenarios	Breakeven number of patients eligible for CT scanner (5 and 10 year).	Annual cost of sub-utilisation according to current demand profile in GBP£ (5 and 10 year)
Comprehensive option	5 year: 44 10 year: 31	£- 212,101/ £ -133,678/
Medium option	5 year: 23 10 year: 17	£- 83,651 / £- 45,952/
Minimum option	5 year: 17 10 year: 12 15 year: 10	£- 41,049 / £- 12,400 £0

Source: Own estimations

It should be noted that the cost estimates in table 4 are very conservative, i.e. without tax, cost of freight and insurance related to the equipment and inclusion of these components could change the break even referral numbers marginally upwards, however not significantly. Likewise the CT scanner needs appropriate instalment and housing that will include extra room facilities and space

[15] All cost estimates are exclusive tax, freight and insurance.
[16] The depreciation assumptions applied depend on the used CT actually procured and the expected lifetime and technological obsolescence related to newest generation CT technology.

which are in relatively scarce supply in St Helena. On the other hand the cost estimates are quite sensitive to the depreciation factor applied (the expected equipment lifetime[17]) that are set moderately conservative to encompass technological development (5 and 10 year). The break-even numbers calculated should therefore be indicative for the relative payoff of the 3 investment scenarios (see table 4) according to focus on referrals only.
According to the SMO 10 referrals could be potentially avoided annually if the on island diagnostic capacity were enhanced by application of a CT scanner. Since this number is below break even for all three options, cost estimates related to sub utilisation has been calculated. The annual costs of sub utilisation are displayed in table 5 and they vary between £12,400 and £212,101 according to equipment standard option chosen and related depreciation factor applied (5-10 years). If a depreciation factor of 15 years is applied for a used CT scanner only the minimum option will be accurately rentable, everything equal. If equivalently counted in number of referrals opportunity cost of sub utilisation will vary between 2 and 34 referred patients annually for the three option scenarios.

According to the current number of referrals, the referral diagnosis profile and average annual cost of scans, the acquisition of a CT scanner will not be a paying investment, ceteris paribus. However, acquisition of a CT scanner will be useful for improvement of on island diagnostics other than for clinical decision making on overseas referrals. The relative magnitude of this additional potential usage is currently unknown, but need to be elaborated and included complementary to the present calculations. However, according to potential cost savings related to the escalating referral costs, acquisition of a CT scanner as a diagnostic tool to improve clinical quality in decision making on overseas referrals seems to be a too costly solution in the short term. If number of referrals increase significantly in the medium term, the least expensive option (the minimum option) should be considered in accordance with the prospect of change in unit referral cost related to the provision of air access in 2010.

Alternatively - if funding for the CT scanner cannot be found - a more powerful X-ray machine with a better resolution to make the transmission easier has been sought-after on island[18]. According to medico engineer experts[19] the following cost-effective approach that upgrade the quality of the on-island x-ray system could most favourably be considered as alternative to the acquisition of CT scanner in the short term. This will allow for significantly increasing the image quality of the x-rays that are currently done on the portable x-ray and potentially opens for the additional purpose of using high quality x-ray in telemedicine. For this dual purpose the following equipment will be required:

1) A simple bucky x-ray system of any manufacturer
2) A CR system[20] with workstation for export of DICOM images

To have the highest level of usage of the system, a simple bucky table with overhead tube on a floor mounted column is recommended. The system should also include a vertical stand for thorax images, used with the same tube as already described.

[17] Depreciation factors: According to Skejby hospital experts the depreciation factor according to technological obsolescence are app. 10 years for a new CT scanner and 5 years for used CT scanner. However, other considerations than technology obsolescence could be included in decision making, e.g. the construction of an international airfield that will open for easier and probably more cost-effective referrals for scans and other advanced high-tech diagnostics. In the cost example above 5 and 10 year depreciation scenarios are therefore applied.
[18] A digital high resolution X-ray has also been suggested as potential acquisition. However, procurement price for a multiple purpose standard model is found to be £ 316,245 (excl. tax, freight and insurance) which is comparable to CT scanner minimum/medium option that was found not to be a paying investment.
[19] Gitte Starup and Jesper Soerensen, medico engineers, Skejby Hospital, Denmark.
[20] CR (computed radiology) is a system that scans the conventional, analogue, x-ray images and digitalizes them for use on a computer.

A best buy option in order to make the best possible change of the current on island x-ray standard - with due consideration to related cost implied - will include the following package with a combination of new and used parts: a new couch and column, supplemented by a used x-ray generator, HT cable, tube, and vertical stand. This option will combine the flexibility, feeling, and look of getting a new system with the best possible price because of the used generator and tube, which are usually the most expensive parts of a conventional x-ray system.

A complete room including new couch, new column, used generator, used tube, and used vertical stand will on the international market for used medical equipment be marketed for a complete price of approximately £13,400 GBP depending on specifications of generator and tube[21]. This price does not include shipping from Europe to Sct. Helena and import taxes.

For the CR, one of the primary manufacturers of these systems, Agfa, Kodak, or Fuji could be applied. The Fuji AC3 systems are known as being very reliable systems with high image quality combined with a very attractive price.

For the purpose of using the CR in telemedicine, a DICOM workstation will be needed along with the CR. The workstation will export the images into DICOM format which will be the format used when sending the images to the remote location.

A complete Fuji AC3 solution including Fuji ADR-1000 DICOM workstation can be purchased for a total price of app. £10,000 GBP. This price includes the complete CR and workstation in good working condition.

Minimum space requirements for installation of total X-ray package (the complete room) are 300 x 450 cm.

As can be seen from table 6 the complete system adds up to a total price of app. £23,400 GBP. Annual recurrent cost adds up to £7,240 which includes an annual service contract plus maintenance. Total annualised will range between app. £9,500 and £12,000 depending on the depreciation factor applied, 5 or 10 years. The price does not include shipping from Europe to St Helena or import taxes.

Table 6. **Procurement of mixed package of used and new X-ray complete room equipment plus CR and workstation application for telemedicine usage**

Used X-ray plus CR application	**Short term cost** (procurement of X-ray equipment plus CR application)[22]	**Medium term cost/ annual recurrent cost** (service contract plus current maintenance)	**Total annual cost** scenario during a 5 and 10 year period[23]
Package solution[24]: Used x-ray components, new couch and column.	Complete room: £13,379 Complete CR and workstation: £10,034 **Total package : £23,413**	**£7,240**	5 year: **£11,922** 10 year: **£9,581**

[21] Al components to the package price are collected from EPOKA MEDIC MISSION A/S; Bjarne Oestergaard Kristensen (Sales and purchasing manager), X-ray & Mammo Department. www.epokamedic.com.
[22] All cost estimates are exclusive tax, freight and insurance.
[23] The depreciation assumptions applied depend on the used X-ray machine actually procured and the expected lifetime and outdate related to newest generation X-ray technology; here 5 and 10 year chosen.
[24] According to EPOKA special offer

Source: Skejby Hospital, Denmark; EPOKA Medic Mission (Denmark) and own estimations.

Regarding *therapeutic equipment* that potentially could reduce the number of referrals with the current staff profile available (both resident and visiting doctors) current availability and standard are judged as being adequate[25].

According to smaller and lower tech solutions the following could be considered. A potential area for significant cost savings are low tech solutions that opens for both treatment and diagnostics. One such example is handling of the increasing disease burden related to comparatively high levels of diabetes found in the SH population. Preventive diagnostic schemes implying visiting specialist (see option 3 below) as well as low tech treatment solutions should be considered concurrently according to the expected increase in cases of severe chronic renal failure, which are among the top 5 death causes of the SH population (Owen 2003). If not adequately addressed and planned for in time these cases could turn out to be a significant future expenditure item on the overseas referrals account if eventually requiring advanced high tech dialysis. Therefore, *chronic ambulatory dialysis* should be considered as a low cost and low tech solution however weighed against the fact that this treatment is potentially prone to more complications.

Another low tech (and low cost) improvement in local diagnostics could be met by assessing patients on island with a treadmill and an ECG.

4.2. Recommendations:

In the short term:

- CT scanner: Everything equal, acquisition of a CT scanner will not be a paying investment as a mean to reduce referral cost. However, a CT scanner will be useful for improvement of on island diagnostics generally and not only as input for clinical decision making on overseas referrals. The relative magnitude of this additional potential usage is currently unknown, but need to be elaborated further and included complementary to the cost analysis above for final decision.

- X-ray/CR solution: Procurement of the mixed package of used and new X-ray complete room equipment plus CR and workstation application for telemedicine usage should be prioritised in the short term. The solution provides significant improvement in the current diagnostic capacity to a low cost and can potentially be combined with a likewise low-cost telemedicine solution (see option 2).

- The pro and cons of low tech/low cost solutions that potentially could improve local diagnostics like the examples above should be investigated further in the short term and considered implemented in the short to medium term.

In the medium term:

- CT scanner: If number of referrals increase significantly in the medium term, the minimum option should be considered implemented. Additionally, in accordance with the prospect of air access in 2010 change in unit referral cost will imply revised terms for decision making related to acquisition of a CT scanner.

[25] According to SMO

- *Chronic ambulatory dialysis* should be considered as a low cost and low tech solution however weighed against the fact that this treatment is potentially prone to more complications. The approach should be accompanied with the recommendation of adding a nephrologists to the HL-2 program. Also simple cardiology diagnostic approaches like the combination of treadmill and ECG should be considered implemented.

4.3. Option 2: Use of telemedicine

The concept of telemedicine has over years had many meanings. Telemedicine is defined here as (Whitten et al. 2002):

A clinical practice for diagnosis, review, or management undertaken synchronously or asynchronously through the medium of information and telecommunications technologies (excluding telephone and fax).

Telemedicine (also referred to as "telehealth" or "e-health") allows health care professionals to use "connected" medical devices in the evaluation, diagnosis and treatment of patients in other locations. These devices are enhanced through the use of telecommunications technology, network computing, video-conferencing systems and CODECs. Specialized application software, data storage devices, database management software, and medical devices capable of electronic data collection, storage and transmission are all key components of the Telemedicine infrastructure.

Telemedicine customarily uses two methods to transmit images, data and sound - either "live", real-time transmission where the consulting professional participates in the examination of the patient while diagnostic information is collected and transmitted, or "store and forward" transmission, where the consulting professional reviews data asynchronous with its collection. Many programs employ both transmission capabilities, to maximize efficient use of resources appropriate to the medical services being provided.

Potentially telemedicine provide the basis for diagnoses and management decisions on the following specialties; cardiology, dermatology, gastroenterology, neurology, ophthalmology, otolaryngology, psychiatry, rheumatology, pulmonary, emergency medicine, trauma, urology and dentistry. Studies of office/hospital telemedicine suggest that telemedicine is most effective for verbal interactions, e.g. videoconferencing for diagnosis and treatment in specialties like neurology and psychiatry (Hersh et al. 2006).

At present the medical staff in St Helena uses *Lord Swinfen's Telemed service*[26] to send photos of x-rays for examinations and advice for further action by radiologists by e-mail. Due to the low resolution of the available portable x-ray machine, the quality of x-ray photos is often low. The SH medical staff anticipate this arrangement as being unsatisfactory since the radiologists at Lord Swinfen Telemed Service very seldom commit themselves to a diagnosis. Advise feedback is primarily characterised as vaguely suggestive and concludes often with "get a CT or MR scan" and therefore inefficient as advisory assistance and of limited value.

[26] The Swinfen Charitable Trust was set up by Lord and Lady Swinfen in 1998, with the aim of assisting poor, sick and disabled people in the developing world. The Trust's policy is to do this by establishing telemedicine links between hospitals in the developing world and specialists who generously give free advice by e-mail (see http://www.uq.edu.au/swinfen)

Extended use of telemedicine has therefore been discussed as a possibility to increase quality on island health care services, especially for enhancing accuracy of diagnosis of patients referred overseas as well as diagnosed/treated in island. Especially among medical staff it is the impression that video conferencing will enhance accuracy of diagnosis[27]. The medical staff is therefore most in favour for investing in the development of telemedicine, however out side of the medical team understanding and support for developing telemedicine is more moderate. Maximum bandwidth on St Helena is 512 kbs which should allow technically for both live "real time transmissions" and "store and forward" transmissions.

In a BMJ review on 55 scientifically published articles on telemedicine regarding evidence for its cost-effectiveness the conclusion was:

"There is no good evidence that telemedicine is a cost effective means of delivering health care. Given the paucity of methodologically sound studies producing robust and generalisable conclusions, there is presently no persuasive evidence about whether telemedicine represents a cost effective means of delivering health care" (Whitten et al. 2002).

However the review also noted:

"*A telemedicine service that is cost effective in the remote highlands of Scotland is unlikely to generate the same cost effectiveness in the middle of Manchester. The difficulty of generating generalisable messages from evaluations undertaken in specific contexts emphasises the importance of assessing the local applicability of individual examples of the use of telemedicine. It is important to recognise that a service may be highly clinically and cost effective in one context but highly ineffective when transferred to another context in which accessibility and quality of local services are far higher*" (Whitten et al. 2002).

Due to the very specific characteristics related to the provision of health care services in St Helena it is therefore not advisable to write off the possibility of telemedicine just because international evidence for cost-effectiveness is still lacking. What is a comparatively advantage of telemedicine compared to for example high cost diagnostic equipment such as a CT scanner, is the relatively low capital cost or "set-up costs". Today a wide range of solutions exist for establishing a comprehensive telemedicine solution. In the following two examples of telemedicine approaches will be given; one taken from the literature on a verified cost-effective solution implying *teleophtalmology* between Moorfields Eye Hospital, London and patients and ophthalmologists at Edendale Hospital, a district hospital near Pietermaritzberg, the provincial capital of KwaZulu-Natal in South Africa (Johnston et al. 2004) and the other a set-up for a standard telemedicine platform mainly for the purpose of transmitting X-ray images.

Teleophtalmology
The set-up cost items included the following: equipment (videoconferencing, slit lamps, cameras, video recorders, cabling and maintenance); installation of telecommunication (ISDN) lines in London and Edendale; and training costs. The equipment costs were based on prices paid in the UK. The installation costs were based on charges paid.

The running costs comprised the staff costs of those involved in the consultation in London and in South Africa, and the telecommunication costs associated with each teleconsultation. The staff involved in each teleconsultation and the duration of each teleconsultation were recorded at the time of each session. Staff costs in London were based on cost per hour of the staff involved, as

[27] According to SMO.

were the staff costs in South Africa. The telecommunication costs (ISDN usage) were costed at the charged rate.

Total *set-up cost* was £13,445 at Edendale hospital and £13,933 at Moorfields Hospital amounting to total of £27,378 equivalent to an average total set-up cost per patient of £242 (see detailed specification of set-up cost in annex). Total *running costs* were £10,283 or £91 per patient, of which 52% was accounted for by the staff costs in London and 47% was accounted for by telecommunications costs.

The set-up costs were the largest proportion of the total costs, but at a total set-up cost of around £27,000 this can be seen as a modest investment compared with investment in a CT scanner that had set-up cost between £361,991 and £769,231.

Standard telemedicine solution mainly for the purpose of transmitting X-ray images
The other example is a relatively simple but comprehensive telemedicine solution[28] that connects closely with the option of acquiring the combined X-ray/CR application package solution described above (Option 1): A solution that implies installation of a complete workstation on both locations. These two workstations will communicate directly through a so called VPN tunnel that ensures a very high level of data security for transmission of sensitive patient data. This solution will only imply set-up cost of approximately £5,351 for each location involved which basically means 2 times hardware (2 strong PCs) with some relatively advanced and expensive software installed. *Set-up price* for total solution will then be £10,702. This price does however not include shipping or import taxes as well as the network access and all other communication costs need to be added to this solution. If taken as a package total *set-up cost for the combined X-ray/CR solution plus telemedicine application* amounts to a total of *£34,115* GBP (£23,413 + £10,702), excluding tax, freight and insurance.

4.4. Recommendations:

<u>In the short term:</u>

- A standard telemedicine solution should be established in order to investigate the potential application for SH health care on a low cast pilot basis. The solution described should be installed in combination with the X-ray/CR package in order to increase potential technical efficiency. Use of Lord Swinfen Telemed Service should be continued in the short term in order to investigate whether the improved technical equipment is entailing a related qualitative feed-back on the advices provided and until a more formalised collaboration partner has been identified.

<u>Short to medium term:</u>

- Though Lord Swinfen Telemed Service may be a cost saving option a more formalised collaboration partner should be sought established in the short to medium term in order to increase efficiency and quality in feed-back. A potential partner in this respect is NICARE with its affiliation with the health care sector in Northern Ireland[29]. Potential synergy effects could be achieved in regard to an extended use of the visiting specialist related to the

[28] The telemedicine package price are collected from EPOKA MEDIC MISSION A/S; Bjarne Oestergaard Kristensen (Sales and purchasing manager), X-ray & Mammo Department. www.epokamedic.com.
[29] Collin Sullivan, Director of NICO, has been contacted on this 31 October and 2 November 2006, but has not responded due to vacation. However, NICO is aware of the proposal.

Health Link II arrangement that could be consulted via the telemedicine platform. Follow up on this issue is required in order to investigate further on feasibility and implied cost.

4.5. Option 3: Increase the number of visiting specialists

There is no private sector practice on St Helena. A strong community nursing programme is in place with nurses providing a comprehensive service covering obstetric care, monitoring child development, community psychiatry, elderly care, acute and chronic care and health promotion and health education. Four medical practitioners with broad general experience provide all medical support. One general practitioner is provided for Tristan de Cunha with clinical support from Nicare. The 4 doctors on St Helena are chosen for their broad general experience and with the right skill mix to ensure coverage of the core specialities of paediatrics, obstetrics and gynaecology, general surgery, general medicine, anaesthetics, orthopaedics. Till recently one of the doctors on St Helena was a talented and multi-skilful surgeon. During his stay he significantly reduced the number of surgery related to referrals due to his high quality and multi talented skills. Apparently the absence of this efficient surgeon has resulted partly to the increase in referrals seen from 2005 and onwards.

By Nicare retaining the responsibility for managing the contracts for the doctors, St Helena has been able to attract and retain medical staff of the same quality and standards of the NHS. Nicare recruits internationally and offers international level remuneration packages. Since the postings are essentially short to medium term through an international employer, Nicare reports relatively little problem with recruiting staff to work on St Helena.

In addition Nicare organises visiting specialists in ophthalmology and optometry, ENT, psychiatry and other specialists as requested by the Senior Medial Officer based on patient needs.

It is widely conceived that with the Health Link II arrangement Saint Helena has arranged itself in a more advantageous position than many other UKOTs since this agreement has solved many of the HR issues that notoriously plagues the other islands, especially in the Caribbean (Sanches et al. 2005).

Several anecdotal evidences indicates the predicaments related issue of applying visiting specialists that on one hand are able to diagnose patients but on the other hand are not able to treat patients on island and thereby adds to the increasing flow and escalating cost related to overseas referrals:

“The main disadvantage for the department is the specialist who only focuses on diagnoses. The visit of the cardiologist this year was partly responsible for the increase in the number of referrals and the early over spend in the budget”.

On the other hand visiting specialist that effectively handles both diagnosis and treatment are well sought after:

“We had a locum surgeon in for the past two months to cover leave and he did 137 surgical procedures during that time, a number of which were major. During this time only three were referred. For this financial year we have referred 50 people, and this is related to the lack of skills of the current surgeon”[30].

[30] CAHSSO

According to the SMO the spectrum of visiting specialist is found to be good although it has been tried to get an orthopaedic surgeon for a long enough visit to do the joint replacements on the waiting list. The orthopaedic surgeon's waiting list up to mid-year 2006 included 92 patients waiting for treatment out of which 6 patients were referred to Cape Town mainly for knee replacement.

The issue of balancing the right spectrum of visiting specialists as well as identifying the optimal frequency of annual visits is a difficult planning task. However essentially the problem lies with differentiation between intervention that implies high and low technology diagnostics and/or treatment, meaning what can be done on island with available capacity in staff, facilities and equipment and what need to be done overseas. Specialties such as cardiology, cancer and major joint work in orthopaedics need eventually to be treated in a more advanced set-up than the on island capacities can provide today. Eventually a large part of these cases must be accepted as amenable to overseas treatment currently as well as in future. Visiting specialist in this area should be applied for confirmatory second diagnosis as well as providing input for overseas referral decisions as set out in the overseas referral guidelines[31] (see annex 3 for overseas referral guidelines). According to cost containment efforts should be focused on reducing the related referral cost to a minimum by focusing especially on charges for transport, accommodation and treatment, see options 4 and 5 below. The rate of visits for the related visiting specialists for these diagnoses should be sought tuned as much as possible to meet the right balance between clinical related considerations for patients diagnosed by resident medical capacity and the relative size of the current waiting list. Resident staff turn-over and attrition[32] will eventually occur and current planning should try as much as possible to anticipate and forecast the staff requirements in order to avoid imbalances to grow out of reasonable proportion so that acquisition of expensive locum key personnel is required. A tendency to rely on short and medium term locum-tenancies due to weak or inadequate planning performance should be avoided and if necessary the planning capacities on these areas should be strengthened.

According to cost containment planning should therefore focus on the speciality cases implying relatively low tech solutions such as ENT, eyes, skin and gynea that potentially can be done on island with the available support facilities and treatment capacities (resident doctors or visiting specialists). Planning and selection of visiting specialist should therefore seek to maximise on island treatment capabilities as far as possible which also in the medium term should focus on specialties that will increase according to the demographic development. Due to the high disease burden related to renal failure derived from diabetes (see option 1 above) specialist visits by nephrologists will be an issue for considerations in the short to medium term.

The question of visiting specialist that deals with diagnoses potentially amenable to low tech diagnostics and treatment should therefore be accompanied by planning consideration of providing the right facilities for the specialities in questions in order to provide an optimal basis for minimising costs, see also option 1.

Finally, the areas of psychiatry and psychology seem to be generally underserved why repeated recommendations has suggested establishment of a full time psychology post on island (Muir

[31] Overseas medical referrals will be recommended by the Senior Medical Officer and the medical team, after consultation with off-shore specialists when necessary and submitted to the Chief Administrative Health and Social Services Officer. The CAHSSO will meet to discuss with the Senior Medical officer and his/her team the logistical arrangements and any administrative/financial implications relevant to the individual cases. This group will constitute the *Overseas Medical Referrals Committee*, under the chairmanship of the CAHSSO. The main determinant will be the patient's condition and the potential for cure or palliation and compassion.

[32] For example, from 15 November 2006 there will be no trained physiotherapists available on island due to attrition implying severe implication for the on island capacity on post operative care and rehabilitation.

2006). According to the CMO diagnosis and treatment related to psychology and psychiatry are mainly made by the medical officers:

"Because we can initiate treatment, we can postpone consultant consultations to a later stage. Because it is not seen as an emergency it doesn't get referred - not always to the benefit of the patient."

However, as an intervention type implying low tech requirements increased frequency of visiting psychologists should be considered. This is not least due to indications of a significant under treated disease burden and - if achieving a higher priority - with significant positive spin-offs to several diseases (not least alcohol related). Further, application of the telemedicine approach to services related to psychology is considered one the most cost-effective usages (see option 2 above). A potential upscale of this area should include telemedicine as a supplementary tool in order to make full us of potential synergy effects.

4.6. Recommendations:

Short term:

- According to the SMO the spectrum of visiting specialist is found to be good. However, in the short term it should be considered to increase the frequency of specialist visits from specialities such as *orthopaedic surgery*, *psychology* with dual qualifications in clinical and educational or neuropsychology and eventually a locum *physiotherapist* to cover leave related to attrition. Also a *trained radiographer* should be considered employed either as short term visiting specialist or more permanently in accordance with the acquisition of the X-ray/CR solution (see option 1 above)

Medium term:

- In the short to medium term frequent visits of a *nephrologist* should be established.

4.7. Option 4: Make formal arrangements with providers of health services in South Africa including Government or private health facilities

At present there are no special arrangements between SHG and RSA providers. It is however widely anticipated that significant potentials exist for cost savings if formal volume based contracts are made with SA providers. The hospital mainly used by SHG for patient treatment and diagnostics is the Vincent Pallotti hospital[33] in Cape Town, however also other providers are used[34]. Efforts from the SMO have previously been made to make more formal arrangements with this RSA provider. The outcome of this initiative was however reported as "very disappointing" and no formal agreement exists today.

The current procedure for referrals is that PHD contacts a particular agent (MD) who - free of charge - arranges the appointments on behalf of PHD. This agent is stationed at Kingsbury Hospital - which is sister hospital to Vincent Pallotti. Bills are then posted to the British Consulate

[33] Vincent Pallottti hospital is part of the hospital chain "*Life Healthcare hospitals*" in the Western Cape. The Life Healthcare hospitals include three hospitals: Life Vincent Pallotti, Claremont and Kingsbury hospitals.
[34] As for example City Park (Christian Barnard) hospital.

(Cape Town) for payment. The payment must be settled within 30 days which indications suggest are not always the case adding an extra cost on individual treatment bills.

Due to the agents affiliation with the Kingsbury Hospital (one of the three Life Healthcare hospitals) there is a potential for conflict of interest that could make the current arrangement more costly than necessary. The potential for underhand agreements between providers and agent is a potential risk when no formal contract is made between SHG and the agent. Further, the consultant is not sensitive to potential cost saving issues related to the comprehensive arrangements related to the SH referrals, such as shipping schedules which sometimes cause the patient to miss a ship to great expense for the SH.

Some uncertainty prevails whether Tristan da Cunha has a formal agreement with CT providers. However, according to the TDC agent in Cape town TDC has for 7 years been into a kind of agreement with Vincent Pallotti hospital due to exclusive use that included discount rates per day in ward, so called "scale of benefit" rates which are about 70% of normal rates charged for foreigners and tourists in other hospitals[35] .

Tristan da Cunha has formally employed a Cape Town based agent that arranges appointments and pays all TDC annual referrals, including contractual arrangements with CT providers. Due to a joint function held by the agent of arranging referrals as well as paying the related bills TDC referral cost are less vulnerable to additional pay due to late payments. This arrangement additionally opens for better follow-up and control of the services actually received and paid for. Also the TDC agent has actively worked for and achieved arrangements with CT providers to limit cost of the TDC referrals.

In order to enhance negotiation power and thereby lower unit cost further through maximised volume of patients the Tristan da Cunha administrator has expressed interest in a joint SHG agreement with Cape Town providers. A joint arrangement between SH and TDC would annually encompass between 70 - 100 patients with a total cost of app. GBP£ 500,000. This number is expected to increase in the years ahead due to ageing of the two island populations.

According to an enquiry to the Life Healthcare hospitals[36], that include Vincent Palloti hospital, the administration has declared its potential interest to enter into a more formal agreement with PHD with the possible inclusion of patients from Tristan da Cunha. According to the contract various models could potentially be applied, such as a simple discounted fee for service combination agreement in return for volume of patients. The deal that would be negotiated can be used in all three of the Life Healthcare hospitals in the Western Cape, cf. above.

Several models exist for making formal arrangements between the purchaser of specialised health services and providers. Most common are volume (block) and hybrid (marginal) contracts. Block contracts normally set a fixed discount rate according to expected volume and all patients receive the same discount rate. Hybrid arrangements entails a gradually increased discount rate per patient admittance – the first admitted patient are subject to a minimal discount rate, however as more patients are admitted the discount rate gradually increases so that last patient admitted are subject to the highest discount rate. Other models could include a combination of the two approaches. Due to the uncertainty and fluctuation in the flow of referred patients the purchaser will pay the provider a kind of subscription fee that could be a fixed amount paid monthly. Because of the subscription fee the purchaser is entitled to attain a certain discount rate according to the flow of patients (fixed or marginal). A bonus component can be added to the agreement if the

[35] For example City Park and Official Gov. hospitals eg (Somerset & Groote Schuur) charge R1902 per night in a ward.
[36] Susan Scholtz, Marketing Manager, Vincent Palloti Hospital, Cape Town, South Africa.

volume exceeds a certain agreed amount i.e. a further discount based on volume. The purchaser then receives the bonus after end of financial year.

4.8. Recommendations:

In the short term:

- In order to increase collective bargaining power against the CT health service providers PHD should enter into immediate consultations with TDC authorities in order to arrange the content of a joint negotiation platform and strategy. The TDC administrator has expressed his interest in such an arrangement.

- A joint SH/TDC delegation should go to CT and have face to face meetings with a selection of preferred health care providers, first and foremost the Life Healthcare hospitals, but not exclusively. However, in order to maximize the advantageous position related to the joint volume *exclusivity* should be considered as one of the terms for negotiation if capacity allows for it (e.g. that all vascular diagnoses from the islands go to Kingsbury hospital under the Life Healthcare hospitals group etc.).

- It would probably be conducive for negotiations with CT providers if the British Government for this purpose could supply a letter of financial guarantee to cover TDC and St Helena.

- PHD should identify a new agent to manage all CT referrals and establish a formal contractual relationship with clear obligations and in-built incentives, especially regarding control, follow-up and payment of a/c's related to the individual patient. A possible solution is to investigate the possibility of making the current TDC agent a joint SH/TDC agent. This will also save PHD for search cost in time and money to identify a new and independent agent. A joint contract made between SHG/TDC should incorporate economic incentives for the agent to reduce referral cost both according to ensure short hospital stays and to ensure short stays in CT after treatment. The agent responsibilities should therefore be upgraded to additionally include *a comprehensive patient coordination function* with the purpose to establish a more cost-efficient stay in CT for TDC and SH patients.

- The current procedure for payment of a/c's via the British Consulate in CT should be changed into a more simplified practise in order to avoid additional and unnecessary cost due to late payment and lack of follow-up. Preferably a future payment arrangement could be linked to the function of the new care keeper in order to ensure better control and follow-up on payments and related service contracts.

4.9. Option 5: Make formal arrangements for transport and accommodation

SHG have made an arrangement with AWShipping that the fares are one set price no matter what cabin. Available cabins on the ship can be very expensive. The cost of passages to Cape Town and return is £750. Cost of passage direct to the UK and return is £1360.

In terms of accommodation, the current arrangement takes full advantage of the fact that around 10,000 St Helenians live in Cape Town. The majority of current accommodation is therefore with relatives or private people ('carers'), who are paid a subsistence allowance. Those people who prefer to stay in hotels or self catering can do so but only receive the same subsistence amount (as the 'carers' would receive), and need to pay any extra costs themselves. The cost of subsistence

for patients in Cape Town is R160 and subsistence rates for patients staying with relatives in the UK is £20 per night. But if they have to be accommodated in bed and breakfast this could double.

The TDC Govt. purchased *the Tristan House* in Cape Town the late 1990's. The potential use has a multi purpose: Any Tristan residents passing through Cape Town can be offered an affordable and secure place to stay during their transit. The Tristan House is used not only by Medevacs, but also by Tristanians going to Cape Town on holiday/shopping trips and those passing through on official or private business. A Tristanian resident in Cape Town is employed as house manager, and he also provides a transport service for the guests. Not everyone uses the house (some stay with friends or relatives in Cape Town). But most travellers prefer to stay there among people they know, particularly if they have not travelled before.

TDC Govt. always send a nominated 'Carer' with each Medevac, who is responsible for cooking/shopping etc for them. Again, the fact that a number of Tristanians are staying at the House at any one time helps provide 'care in the community' for Medevacs there too.

According to the TDC administrator Saints are welcome to stay in the Tristan House if there are any vacancies. However, capacity is fairly limited and mainly occupied by Tristanians so there is not a basis for a permanent agreement with PHD on joint use.

4.10. Recommendations:

In the short term:

- SHG should investigate the possibility of making use of the Tristan house transport for special referrals such as the elderly and walking impaired so that the cost of individually hired transport will be saved.

- SHG should try to make use of available vacant capacity in the Tristan House.

In the medium term:

- SHG should consider establishment of permanent accommodation in Cape Town like the Tristan House either to purchase or on rental basis. A permanent accommodation in Cape Town would ease the logistics related to referred patients significantly. The establishment of a permanent accommodation should therefore be linked closely to the responsibilities of CT referral agent to ensure an efficient patient stay in CT, cf. option 4 above. Anticipated price for purchase of a house in CT that would match the SH capacity requirements is around £ 0.5 to £ 0.75 million in current prices.

4.11. Option 6: Health insurance, Government or private

The trend in overall health care expenditures in including the rise in overseas referral expenditures indicates that the system currently are in a situation of 'financial alert'. Introduction of an alternative finance model has therefore been discussed in order to raise more revenue. Primarily the potential future introduction of a *contributory national health insurance scheme* has been discussed on

several occasions, forwarded by the administrative level which is in favour for moving in that direction.

The immediate background for the proposal is typical for micro states: Introduction of health insurance schemes is sought as an easy way to levy increased revenue generation to match the increased health care expenditures and to solve the inherent free rider problem of expatriates in the current tax based finance model. Over a thousand St Helenians are currently working abroad - i.e. mainly Ascension and Falklands who inevitably return home to expect free health care. These people have lived and worked abroad making higher income and savings than the average resident population on island. Often these expatriates return to St Helena to retire, expecting to have free health care[37]. A majority of those people who remain on island and work all their lives end up with a very small or no pension. Those who have a small pension receive a top from Social Security to bring them up the SS payment rates.

One of the main reasons for proposing a national contributory health scheme was therefore to allow people living abroad to invest in their health care upon return to the island and thereby reduce the inherent free-rider component in the current approach for health finance. However, SH politicians have turned down proposals on social insurance schemes due primarily to concerns of equity aspects related to the universal contributory mechanism of the financial set-up related to the resident people. Especially the segments of the resident population with a less advantageous income base were a concern.
International evidence suggests that finance methods of general revenue and social insurance have the highest equity outcomes according to mobilisation of funds, accessibility to health care and financial protection (Hsiao 2001). On the other hand private insurance, user fees and direct out-of pocket payments are the most inequitable of financing methods.

Where additional revenue from general taxation is not seen as possible or desired, governments have looked to user charges, private health insurance or national health insurance as possible sources of finance for health care. Though models implying only user charges or private insurance schemes widely are regarded as unacceptable in its purest forms due to equity concerns and market failure[38]an increasing interest has focused on social insurance models that combine the virtues of government public financed health care provision (full coverage, free access and high degree of equity) and the virtues of market based private insurance (free competition, efficiency and lower cost). In the following an example of this hybrid insurance model will be presented and discussed for its potential application in St Helena.

Anguilla initiated in 2006 introduction of new national health insurance scheme that seeks to combine the virtues of private and public provision of health care services. The objective is that the national health insurance scheme by establishing a fund (the Fund)[39] will cover the health care costs of the whole population in an equitable manner. It will be managed to ensure that money is spent on high quality, value for money services, and that it is not wasted on unnecessary treatment.

[37] The number is however unknown. Efforts in the medium term should therefore be taken to better quantify the relative magnitude of the inherent free rider problem.

[38] Since SH politicians have turned down proposals on social insurance due to the considerations about implied equity outcomes, it is least probable that private insurance schemes will find their way onto the political agenda or be accepted, either in the short or medium term.

[39] Though called National Health Insurance (NHI) the principles are the same as for social health insurance. Agenda focus has changed over the years from an indemnity type insurance model to that of setting up of a **national health fund** (NHF or 'the Fund') with contributions from Government and population in about equal proportions, with some user fees retained as a way to direct health seeking behaviour.

The principle is that individuals contribute to the Fund when they are 'spenders' and 'earners', but that the Fund pays for care for everyone as it is needed – including children and dependents as well as those 'spenders and earners' when they are retired and can no longer contribute as much.

It will be financed by a combination of:

- GoA revenues for health care from the Consolidated Fund
- a dedicated levy or levies on the consumption of selected items[40]
- contributions from employers/employees based on income.

By beginning to pool out of pocket and government expenditure into one fund, it is intended to achieve a more equitable and sustainable financing mechanism that either private health insurance or the two tiered system of fee for service private and public sector services.

The intended vision behind establishing the Fund is to stimulate and make use of the emerging competition among the government as well as private health care providers mainly on-island but also overseas. By creating a national health purchasing organization (the Fund) run by a technical capacity into which all sources of funding flow the main function is less about collecting the money which the social security mechanism will ensure, but more about *spending the money right* in order to get most value for money. Therefore the purchasing mechanism has to be autonomous with an arms length from the political decision making so that decisions about spending is made as rationally and unbiased as possible.

The different sources of revenue will be channelled to the Fund. The Fund will buy health care services from approved providers of those services. It will be managed by a technical capacity that is able to negotiate quality and prices with providers on contractual basis. Providers will include the Health Authorities of Anguilla and private practitioners on-island, and selected overseas hospitals for care that cannot be provided adequately on-island. Private primary care will include approved providers on Anguilla and St Maarten.

In the Anguilla model health care provision has been removed from government which instead is set up to compete with private providers on-island and on nearby St Maarten and elsewhere. The Fund will also be used to purchase VFM tertiary care from overseas, e.g. from St Maarten, Puerto Rico or Miami (USA) that are in a reasonable distance.

The whole reform process of establishing the new health care insurance system will be taking 2-3 years, commencing this year with expected full introduction in 2008, see checklist for key tasks during start-up in Annex 4 (England, 2006).

The short term cost of establishing the Anguilla insurance model confines to technical support to initiate the reform process, significant communications costs to sell idea and details to public and to establish a board for administration and accounting. If the latter is already in place in some form, as the SS board in Anguilla, this managerial unit can be brought into operation by subcontracting. The Fund is expected to be self sufficient due to transfers of monies from Govt. and population as well as user fees from current activities.

As the Fund will act as purchaser of health care services on behalf of total population development of a more competitive environment among the health care providers is supposed to take place in the medium term. The initial array of health care providers is likely to change gradually as private providers get their act together due to the increased competitive environment. Eventually health

[40] an additional levy on electricity bills has been suggested: A 5% tariff will raise around EC1.7m assuming GOA is exempt.

care services will be supplied with higher quality and lower unit cost to the benefit of the consumers.

Several estimates has been made on total requirement for health care expenditures (to go into the Fund). One estimate from January 2005 calculated a total financial requirement of EC$ 22.5 million[41] for the 13,477 population of Anguilla (England 2005). According to this estimate the annual per capita cost in US dollars amounts to app. US$ 620 or GBP£ 326. Another estimate estimations reached a total financial requirement to range around EC$ 25 -28 million, with equivalent per capita estimates ranging from US$ 690 / GBP£ 365 to US$770 / GBP£ 405 (Sanches et al. 2005).

However, the mechanism to ensure that most value for money are achieved will only work if there is some choice in where to purchase the health care. In the Anguilla case - besides a variety of public and private providers on-island – this mechanism is nourished by the favorable situation of nearby overseas health care providers supplying services at competitive cost levels.

Pros and cons for potential application of the Anguilla NHI for St Helena:

- The basic premise for producing cheaper and higher quality health care services relies heavily on the precondition that the Fund has a reasonable broad variety of choices in selecting different providers. This precondition is not fulfilled for St Helena, where only a Govt. supplies health services as a monopoly provider and nearest private providers are in remote South Africa.
- According to recent estimates the annual per capita cost in US dollars of the Anguilla NHI ranges from a lowest estimate on app. US$ 620/ GBP£ 326 to maximum estimate of US$770 / GBP£ 405. This compares at first favorably with 65% to 81% of current per capita health care expenditures on St Helena (US$ 950/ GBP£ 500). Everything equal, a direct replication by St Helena of the Anguilla NHI model would imply annual expenditures in the range of GBP£ 1.3 - 1.6 million. However, the estimates on Anguilla NHI requirements includes some assumptions and guesstimates on various expenditure items, such as overseas care. Since this is considered as one of the most difficult items to project[42] the precision of the estimates of total expenditure requirement therefore seems be linked with some uncertainties according to the assumptions made. Actual expenditures could therefore very well exceed these preliminary estimates in near future and approach the per capita expenditure levels of St Helena. Of course, the reverse could happen, however increases are most like not least due to the demographic development that Anguilla shares with other UKOTs.
- With a GDP per capita 3 times as big as St Helena the tax base in Anguilla seems to be much more advantageous than St Helena when concerning the third revenue source to the Fund; contributions from employers/employees based on income contributions. If replicating the Anguilla model this component would potentially entail a significant risk to increase St Helena labour cost and thereby reduce competitiveness and foreign investments. Due to a much smaller population size (one third) and significantly smaller tax base as measured by GDP per capita St Helena appears much more vulnerable in this area.
- In the Anguilla model some user fees are retained as a way to direct health seeking behaviour. Though already in place on St Helena this approach could potentially be further applied in areas where health seeking seems to be out of proportion according to a reasonable demand.

[41] equivalent to US$ 8.3 million and GBP£ 4.4 million
[42] Cf. interview with Roger England, key consultant on the financial set-up of the Anguilla NHI

- However, direct replication of the Anguilla NHI cannot be recommended according to the lack of preconditions required to make advantage of the incentives in-built in the model, not least the required availability of a competitive array of providers to purchase services from. If replicated the introduction of a national insurance scheme would only act as an additional tax, funding an existing public service with the same old incentives implying potential adverse effects on the St Helena economy due to increased labour cost and reduced competitiveness of key priority areas such as the tourism product. Additionally, there is little point in raising new public finance if it will be spent ineffectively.
- If St Helena policy level decides anyway to prospectively move in the direction of introducing an insurance model like the Anguilla NHI in the longer term, initiatives to prepare the pre-requirements for this should be sought established gradually over the coming years, including introduction of a competitive environment among health care providers. However, this step requires preparatory in-dept investigations on issues related to sustainability and feasibility that takes into account the establishment of the international airport and related change in prevailing conditions.

4.12. Recommendations:

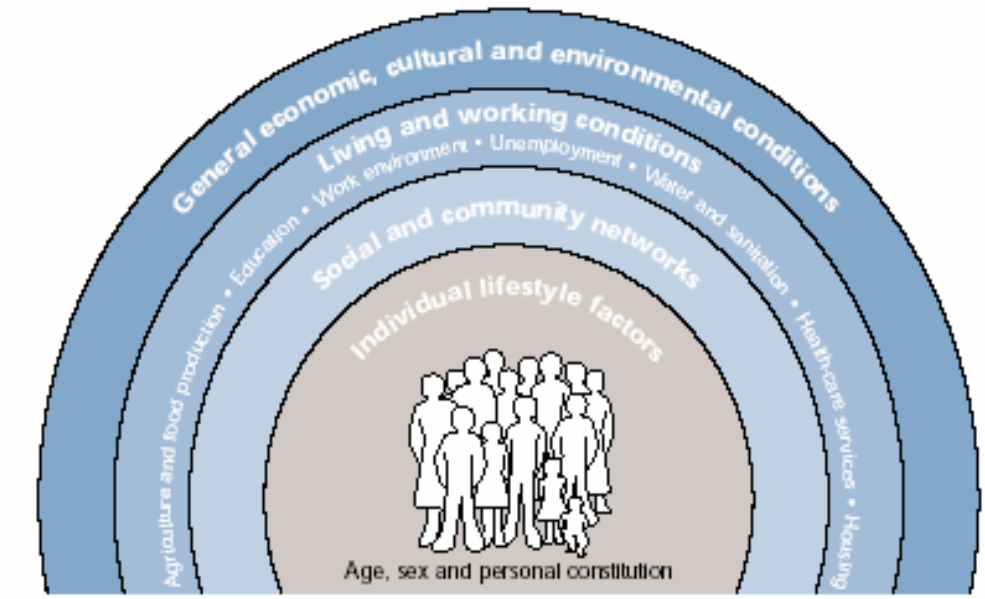
<u>In the short term:</u>

- Since St Helena do not provide the prerequisites for feasible introduction of a social insurance scheme (as the most realistic option for reform of the current modus operandi in health care finance) it is recommendable to continue health care provision on the basis of the existent system. However, due to the current situation of increasing general health care expenditures as well as the prospect of significant further increases in future efforts should be directed at optimizing the current system in order to cope with the current as well as future challenges.
- The policy level should go into dialogue with the population according to perspectives of development of the health care sector. The agenda of this dialogue could include the possible departure from NHS level health care provision due to future budget constraints, the possibility of providing a health care package as a minimum level for free Govt. provision and population participation in general public health interventions.
- Acquisition of low cost/low tech diagnostic equipment should be considered instead of high cost/high tech solutions (cf. option 1). Especially low cost solutions that imply transfer of managerial and clinical input for decision making such as telemedicine, should be prioritized (cf. option 2).
- In the short term the policy focus should be on sustaining and further developing the health Link II program that are a cornerstone in ensuring a high level of primary care where significant diagnosis and treatment potentially can be performed by use of short term visiting specialist. In an environment like St Helena it is essential that visiting specialist are identified that are well suited for efficient all-round performance in both diagnostics and treatment. In order to optimize coverage of specialist services some current gaps need to covered (cf. option 3).
- Arrangements with health care providers in South Africa as well as logistic and accommodation arrangements related to referrals to Cape Town needs to be strengthened. Significant potential cost savings should be achievable in this area (cf. option 4 and 5).

<u>In the medium term:</u>

- In the medium term it is expected that the age group 60+ will make up a significant share of total demand on health care. In order to make better use of available strategic means to contain health care cost attention needs to be directed at the broader factors affecting health, cf. figure 10. It is therefore essential that the public health initiatives[43] established in the short term will be fully unfolded and actively working in the medium term. Only the combination of an efficient primary health care supported by a strong multi sectoral public health interventions will be efficient safeguards against the prospect of significantly increased future health care cost.

Figure 10. Determinants of individual health

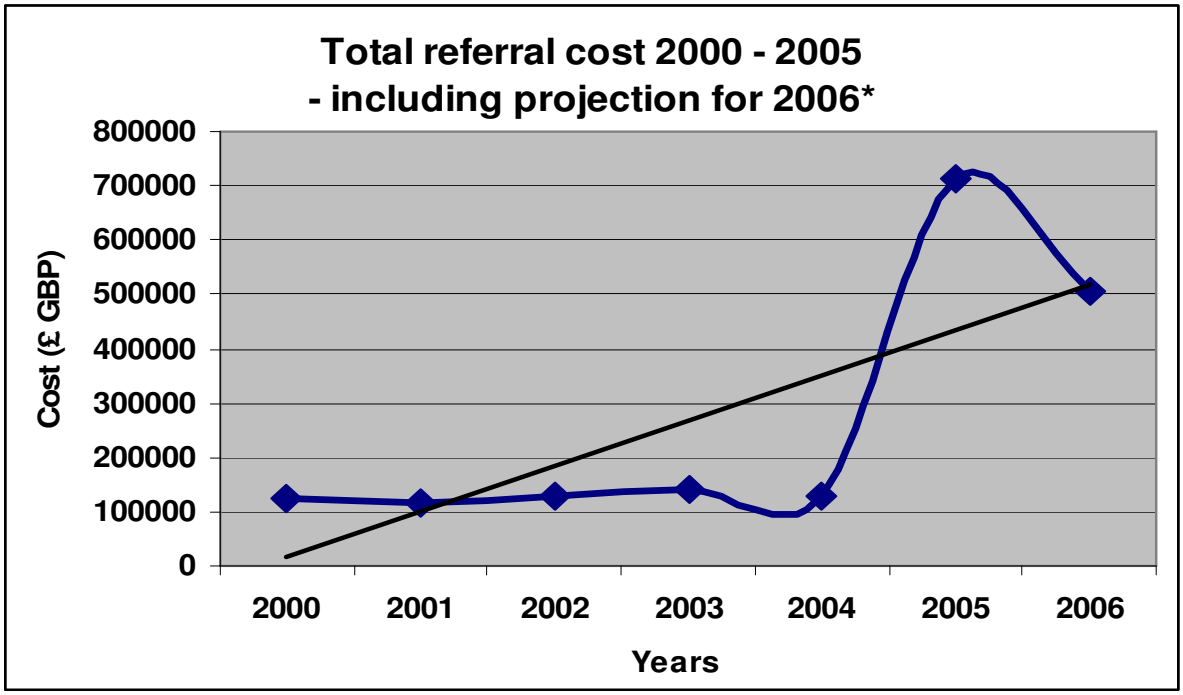


Source: Diederichsen et al. 2001

ANNEX 1

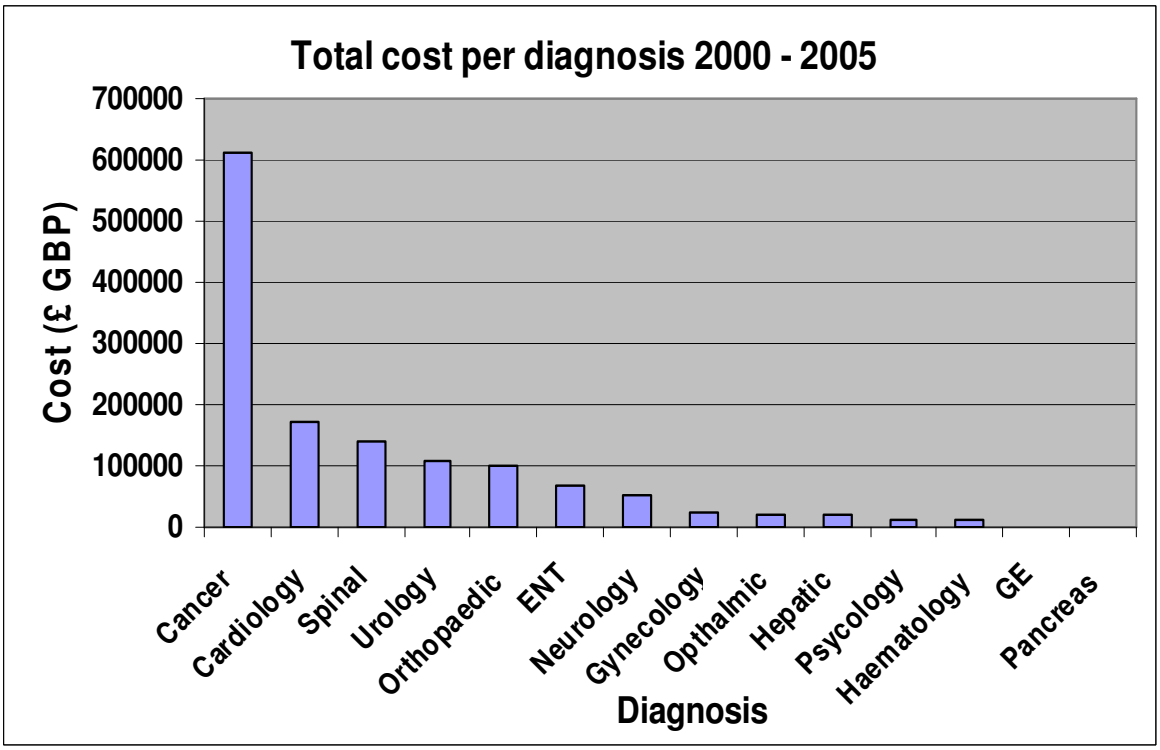
Figure 1

[43] Such as the cross departmental group set up last year to develop broad public health goals



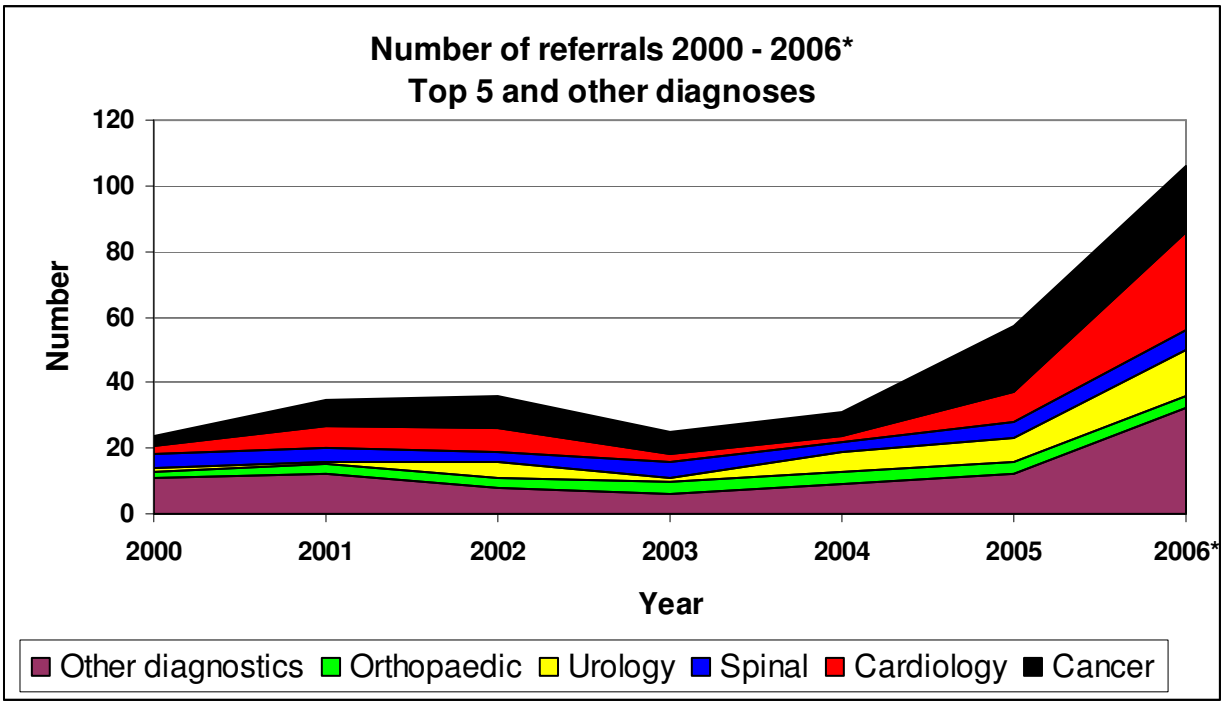
Source: SMO 2006 and own calculations

Figure 2



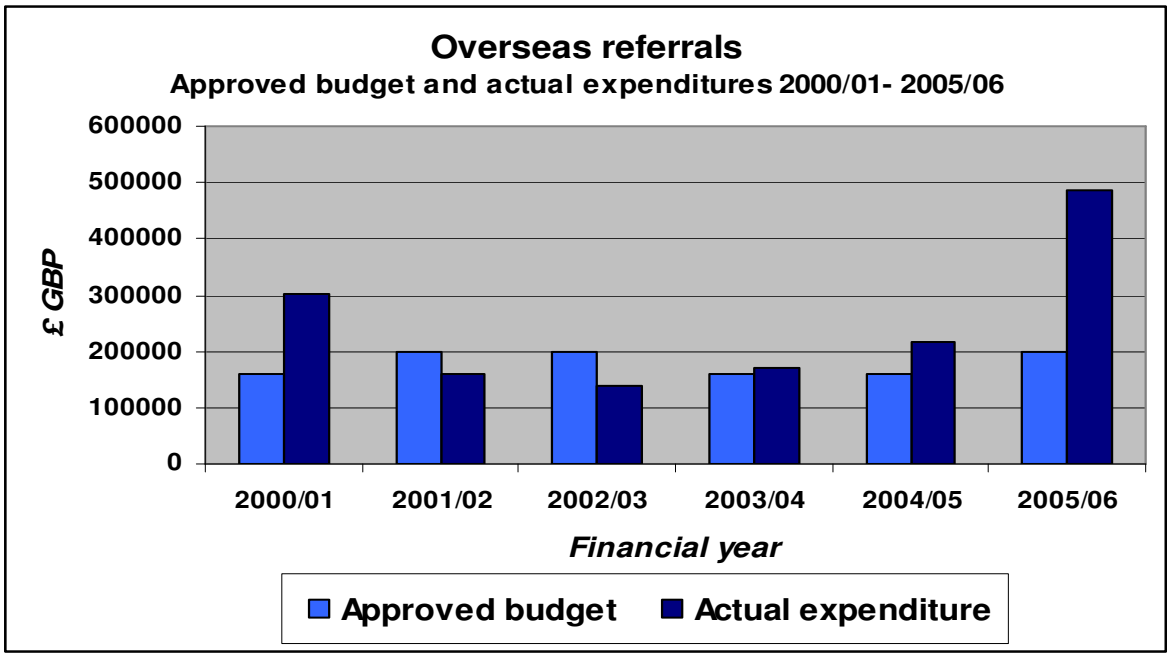
Source: SMO 2006

Figure 3



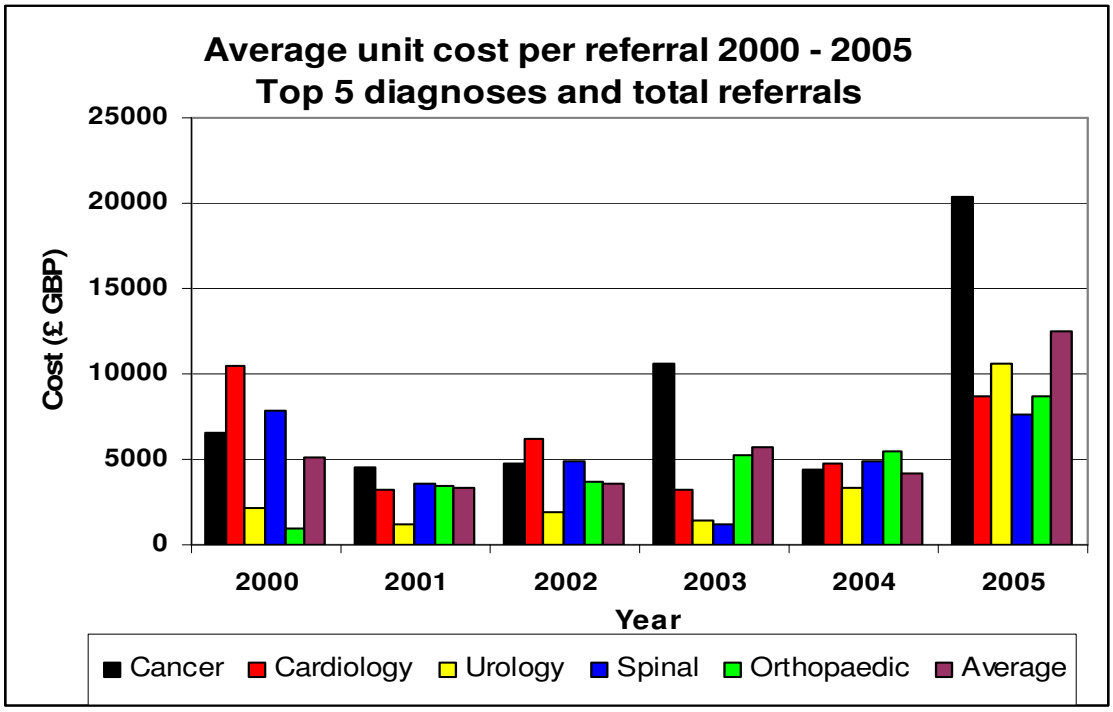
Source: SMO 2006 and own calculations

Figure 4



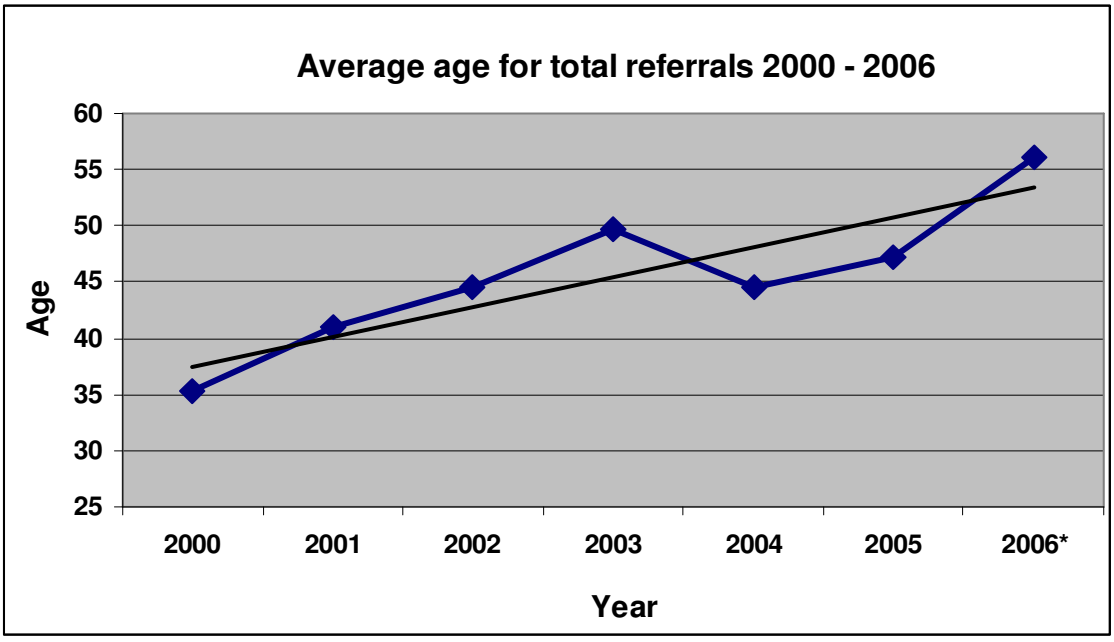
Source: CAHSSO

Figure 5



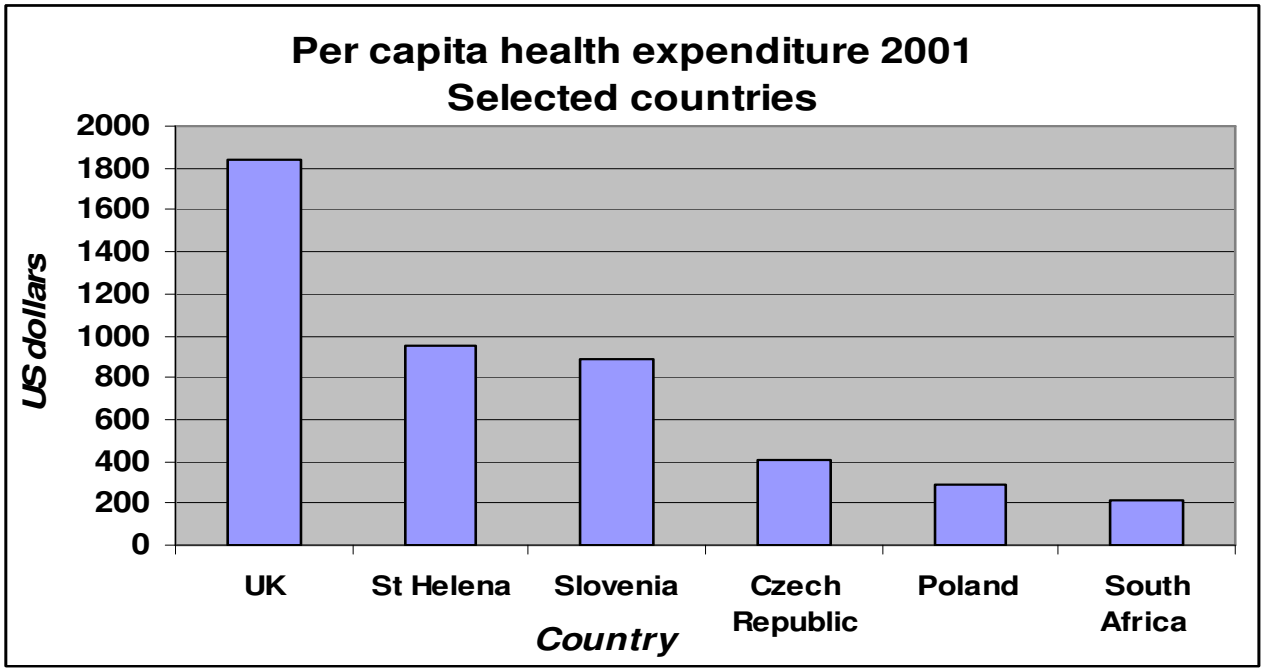
Source: SMO 2006 and own calculations

Figure 6



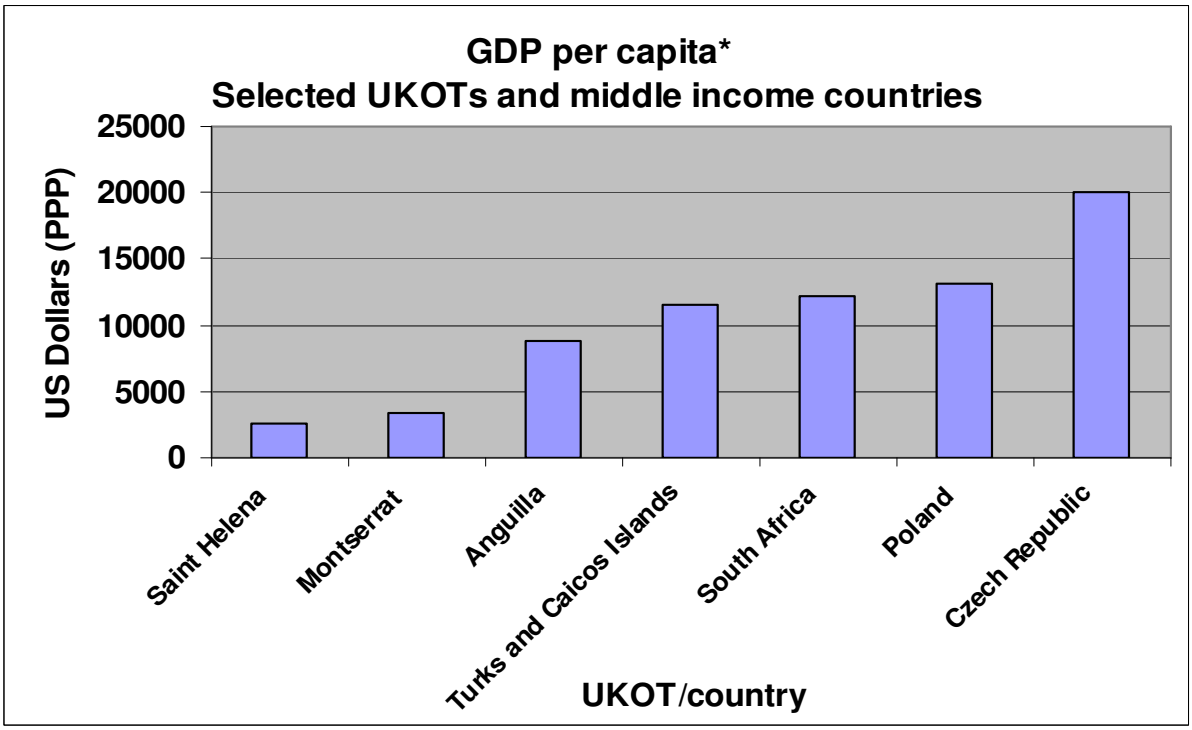
Source: SMO 2006 and own calculations

Figure 7



Source: Own estimation (for St Helena) and WHO, World Health Report 2006[44] (countries).

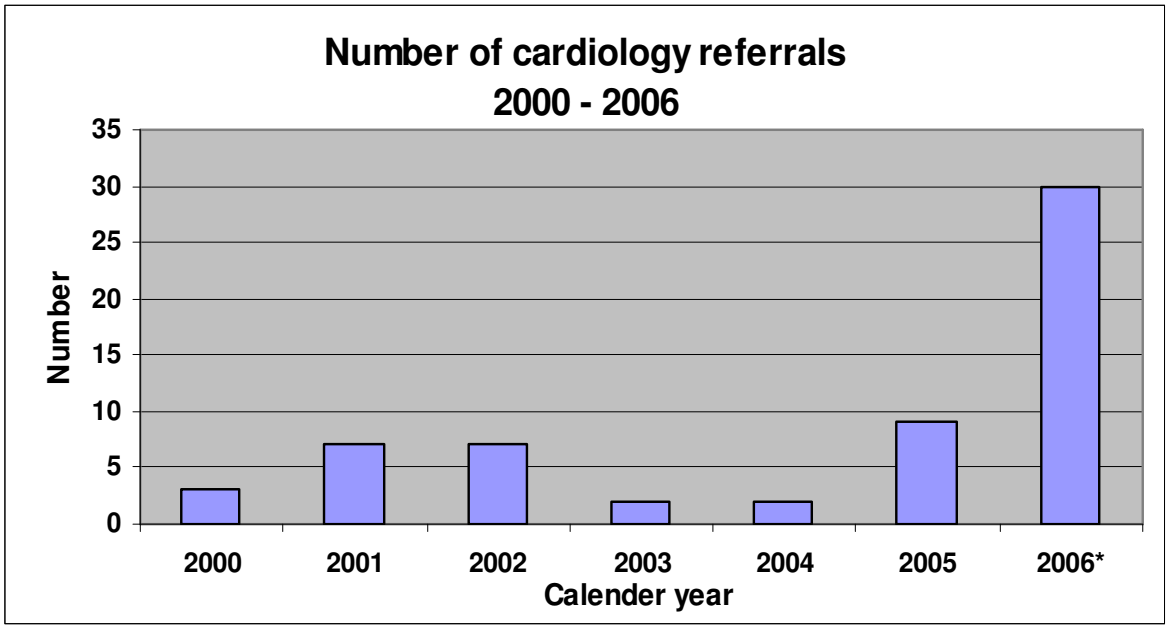
Figure 8



Source: CIA World Fact Book 2006 (www.cia.gov/cia/publications/factbook). *Latest available years.

[44] ww.who.int/whr/2006/annex/06_annex3_en.pdf

Figure 9



Source: SMO 2006 and own calculations. *2006 is projected by a simple straight line projection based on the diagnosis related referral pattern for the 2 first quarters of 2006.

ANNEX 2

Specification of set-up cost of teleophtalmology

Cost type	Edendal Hospital, SA	Moorfields hospital, UK	Total
Equipment			
Videoconference equipment	3,328	3,328	6,656
Slit lamps	1,270	0	1,270
Hand held camera	1,973	0	1,973
Video recorder	0	2,454	2,454
Cabling	552	552	1,104
Maintenance of video conference equipment	250	250	500
Installation			
ISDN installation	154	600	754
ISDN rental	670	2,160	2,830
Training			
Staff	476	0	476
ISDN usage for training	1,033	2,140	3,173

Staff	2,240	2,450	4,690
Travel cost to South Africa	650	0	650
Subsistence	850	0	850
Total	**13,446**	**13,934**	**27,380**

Source: Johnston et al. 2004

ANNEX 3

GUIDELINES FOR OVERSEAS REFERRALS

The decision on whether to refer a patient for medical treatment overseas is made by the Medical Staff acting as a team. Whilst the decision is broadly based on a number of factors it should be appreciated that each medical condition and patient is unique; therefore these guidelines cannot be taken as final, as other factors may also have to be considered.

A **There are two issues, which are considered initially:**

1 **Will the patient derive tangible medical benefit?**

2 **Is it impossible to achieve a medically acceptable outcome without referral?**

B **A number of other factors are also considered:**

1. **Is the patient prepared to leave St Helena for treatment?**

It is possible that patients may be strongly opposed to any treatment which requires them to leave the island.

2. **Will the treatment add to their quality of life or their longevity?**

There are cases where because of age or general debility, overseas treatment for whatever reason is unlikely to add greatly onto their quality of life or to their longevity, and referral incurs significant risk of the patient dying overseas. In these cases a judgement is made on "quality life years" likely to accrue from referral and a decision made accordingly.

3. Does St Helena have the facilities to provide appropriate after care?

For conditions requiring regular and frequent specialist supervision, or continued specialised monitoring or equipment, it is unwise to initiate treatment. At the present time this includes conditions such as kidney failure and organ transplant.

4. Is the condition too urgent to wait for a visiting specialist?

Even though a condition may be treatable by one of the specialist who makes regular visits to St Helena, in some cases the condition may be too urgent to wait until the next visit.

5. Does the patient have a cancer that cannot be treated on St Helena?

Although many cancers are treated on St Helena, there are certain types which are referred. The justification for this is that prognosis in these areas is highly dependent firstly on the skill of the specialist surgeon, but also on the addition of adjuvant treatment, meaning chemotherapy agents and radiotherapy which are not available on the island.

6. Does eventual treatment on St Helena necessitate initial investigation which cannot be carried out locally?

There are several areas where it is essential to have a definitive diagnosis prior to invasive treatment. The main areas are in back surgery and neurosurgery where scanning has revolutionised treatment. It is not practical for St Helena to invest the capital and provide the expertise in this field, and so for the foreseeable future overseas referral will remain necessary.

7. Can St Helena provide the necessary intensive care after surgery?

For many operations, which could be carried out on St Helena an intensive care facility is essential to provide appropriate post operative care. At the present time constraints on staffing and lack of equipment necessitate referral.

8. Does the frequency with which a condition occurs make it cost effective and safe to operate locally?

There are many operations that the medical staff could consider doing on St Helena but the infrequency of these would not make it cost effective for the necessary equipment to be purchased. In addition it should be considered that if a surgeon is seeing a particular condition only once every two years or so, whether it would be more appropriate to refer the patient to a specialist centre.

Source: CAHSSO

ANNEX 4

Anguilla National Health Fund

Key tasks during Start-up Project: version 18.09.06

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1. NHF Start-Up Project (SUP) Team

- appoint SUP Project Manager
- establish office
- maintain / update the *NHF Manual of Intentions and Procedures*
- start process to appoint NHF Director
- work with the public health function of the MOH to define new role and needs

2. Policy issues

- presentation / seminar for selected ministers and senior civil servants to ensure concept and details of the Fund are understood, and that policies are politically acceptable eg. charges for overseas care, hospital fees, dental, drugs etc., constitution of the Board, level of contributions from earnings and from Consolidated Fund, negotiations with 'losers', Communications programme
- SG to agree these as much as possible and present recommendations

3. Legislation

- NHS Act, draft 5 to be submitted to MOF and MOH for review
- final review by SG, consultants and legal draftsperson
- MOF/MOH to take to ExCo
- MOF to take amendments to HAA Act to ExCo

2. Operational systems and procedures

2.1 Organisational issues

- appoint NHF Board members and hold inaugural meeting and orientation session with SUP Team

2.2 SSB support and contractual arrangements

- SSB staff to develop working systems with support from consultants, based on document: *NHF information and data flows: version 1, 31.08.06* and its updates

- consultants to draft contractual arrangements between NHF and SSB

2.3 Procurement of health care services

Primary care

- prepare the description of the General Practice minimum package to be funded by NHF (this is the package that will be tendered for by providers)
- hold group and individual discussions with primary care providers including private, HAA, and appropriate providers in St Maarten to explain the concept and intentions
- publish in the media the intentions and the description of the minimum package of General Practice
- prepare contract for General Practice for the HAA based on the minimum package (the HAA is likely to be the only provider able to offer this package at the start of the NHF but this may be contested by other providers in time)
- prepare contract for other primary care components for the HAA (community psychiatry, extended care, dental etc) which are currently provided by the HAA and that are not an essential component of the General Practice minimum package
- define payment rates, required patient registration and information procedures, medical records procedures, referral procedures, and performance review mechanisms
- negotiate with HAA (and any other potential providers) and prepare final offer contracts for starting in 2007
- develop NHF register of patients based on SSB identity cards plus information receivable from primary care providers on which patients have registered with which provider

Secondary care

- negotiate HAA budget principles and details for 2007 including introducing an investment element in prices to cover capital depreciation and introduction of appropriate new technology (how much dialysis is Fund prepared to pay for?)
- review and agree joint performance review mechanisms
- agree on ceilings / rates for user charges for 2006 (note the need to sell the programme to the public suggests that charges should be minimal, and that rates can change over the years)
- agree mechanisms for overseas referral approvals and for monitoring patients when in overseas care
- prepare contract for 2007

Overseas hospital(s)

- review the contract between HAA and Centro Medico del Turabo, Inc (HIMA); review the capacity and quality of Centro Medico del Turabo, Inc (HIMA), and agree any changes needed including services, unit costs, treatment approval arrangements, billing arrangements etc
- prepare contract with Centro Medico del Turabo, Inc (HIMA) or other selected hospital

3. Communications programme

- minister's speech
- convene Communications Working group from relevant ministries/agencies
- hold sessions/negotiations with potential 'losers' eg. police and nurses who get 100% refund on overseas medical bills (GOA recovers 80% from CS insurance); civil servants will lose CS insurance and will have to start contributing 2.5% of earnings
- education programme for GOA in terms of seminar and paper
- prepare materials for programme: 'will I be able to . . .?', 'what will it mean for . ."

4. Finance

- prepare spreadsheet: budget for 2007 with estimated income and expenditure by source and application (NB. 132 social cases with exemption from hospital fees amounted to EC$150,000 paid by SS; dialysis costing EC$200,000 from SS budget)
- HAA budget for 2007
- required contribution from Consolidated Fund
- required % contribution from income

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