# The MEDCAL Community
# Coronary Heart Disease Tutor

Developed by the Rotherham Road Medical Centre in conjunction with MEDCAL Ltd

## Heart disease a community wide problem

Heart disease is responsible for 2,000,000 deaths a year in the UK. It is the largest single cause of death with 37% of the total deaths. Ischaemic heart disease and stroke the target of this program account for 86% of the heart disease deaths or 32% of the total.
As well as the deaths they also produce a high degree of morbidity often commencing well before retirement age. As only 1 in 5 people who suffer a heart attack return to work after treatment the financial cost to the community is disproportionally high compared with the other major causes of death.
The most disturbing factor in this is that 95% of all heart disease under the age of 75 is preventable by quite simple changes in life style and medical interventions that are tried and tested.
Figures from the British Heart Foundation show
1. Each person stopping smoking reduces coronary risk by 25%
2. A 5mg reduction in diastolic blood pressure reduces Coronary Heart Disease(CHD) by 16%
3 A 1% reduction in cholesterol reduces CHD by 2-3%

In Finland a combination of strategies have lead to substantial reductions in heart disease and proved that it is possible to make a significant reduction in CHD levels.

### Why, it is often asked, has the UK made so little progress in this area?

There are many reasons for this to which the following factors contribute.
1.The huge numbers of people involved mean that a community wide education programme is needed to bring the medical and life style interventions needed to all those at risk.
2.Each individual has their own combination of life style, social and inherited
factors, so blanket programmes have always failed as they cannot give specific personal advice.
Previous community programmes have failed due to the huge costs involved in using this approach.

The following document gives details of the Heart Disease Tutor developed by Dr P Tyerman and the primary care team at the Rotherham Road Medical Centre.

### The Target

The initial target was to produce a heart disease prevention program to enable patients to assess their own risk of getting heart disease and receive appropriate advise on prevention.

### Background

The Rotherham Road Medical Centre is in Barnsley South Yorkshire.
The practice is in an ex mining community with high deprivation levels.
In heart disease terms Barnsley has the second highest heart disease death rate in England and the practice area has 147% of the Barnsley average for heart disease.

### Previous work

Several groups have produced work that show that life style changes do effect heart disease rates. In this country the reference work is often the Oxcheck study(BMJ 1995:310:1099-104). This shows that life style changes did make a small but significant effect on heart disease. The National Service Frame for CHD(Department of Health Mar 2000) and the Joint recommendations also recommended/require action in identifying and advising those with increased risk of developing coronary heart disease. It has been demonstrated by Graham Archard(Director Succeed Project) in the British Journal of Cardiology(2001:8:4) that 9.4% reducing to 7% of GP's total available time would be needed to complete the normal recommended CHD prevention program. The article shows primary prevention cost at £5,269.76 per life year saved which is probably acceptable compared to some other actions however this approach would cripple primary care due to the cost and the shortage of doctors and nurses .

## Starting point

The medical centre had developed the RISK CHD prevention program for health professionals which had proved both popular and effective. However to get even better results we felt it wold be advantageous to be able to offer on request advice There is a considerable group within the population who do not consider their risk of CHD is sufficiently high to warrant "wasting the doctors (health professionals) time" when the they are not " ill".However experience shows that most of the population have only a very inaccurate appreciation of their likely level of CHD risk .It seemed self assessment using a method which allowed the individual to find out their own risk without needing to consult would spread the heart disease prevention message to this group as well as giving more education to those already aware . After some discussion we concluded that self assessment was the answer but that leaflets had not in the past proved effective therefore could we use IT?.

## Perceived Problems

1.Would it work?. We could find no previous work on the use of IT in this way . There was evidence for on screen advice but not which involved using user information to target the advice. More recently evidence has been published confirming the effectiveness of this type method.
2. Would patients use it particularly the older non computer literate patients?
3. Would confidentiality on a open access system be a problem?
4. Could we find the correct technology?
5. Would the method prove cost effective?

## The method

We looked at various possibilities as to how the assessment and advice could be given .The need for " no keyboard skills" led us to the conclusion that touch screen technology was the best approach available. The highest level of CHD is in the most deprived areas of the country so systems requiring personal IT skills would be unlikely to reach a large slice of the high risk individuals. This led to the conclusion that Internet and personal computers programs were not going to meet the needs of the health education problem.

We therefore developed an interactive touch screen computer program based on the Medcal RISK CHD heart disease assessment program which would allow the patient to enter each of the factors needed to build up a personal risk profile on the screen. The program uses visual clues (thermometer colour) to indicate risk factors. It gives relative risk score and allows the patient to experiment with the effects of lifestyle changes as well as giving advice on the life style changes themselves and how they could be implemented. The program also picks out high risk groups and advises consultation with health professional as well as encouraging compliance with therapeutic regimes.

## Why this approach?

Heart disease starts developing from soon after birth taking many years before becoming symptomatic. The rate of development is dependant on multiple factors each of which has an effect on the speed of that development. Changing these factors can change the age of disease onset by many tens of years.
Therefore identifying individuals that are at risk of heart disease before symptoms or adverse events occur gives the opportunity to avoid heart attacks. The avoiding of these events has significant effects not only on the individual but also on their family and community. The financial effects of a single heart attack on family, community and employer can run into six figures.

# How the CHD Tutor works

## 1. The CHD Tutor is placed in a suitable environment

The pilot model was in a surgery waiting room. Placed there with 2 A4 size notices saying "test your self for risk of heart disease". It performed over 1000 assessment in the first 12 months and has now performed over 2000 assessments. Where as the surgery or hospital waiting room may be very successful it seems that any public place from shopping centre to pubs will also get considerable use. Placed In a call centre one CHD Tutor did over 100 assessments in 4 days. In those who do not normally consider they have any health problems easy access when they are thinking of health is essential.

## 2.User action

The user sees the movement and sound of the displayed scenario of a person having a heart attack and being taken to hospital running on the screen and natural curiosity makes them watch. It plays out the story giving information on ambulance response etc . As the story progresses they are invited to assess their own risk of heart disease few resist the invitation. The user answers a series of simple questions about themselves to which the tutor responds with the level and significance of each factor entered. A thermometer and chart build up step by step. Creating a total view of the individuals risk of developing CHD. If a risk factor is alterable advice on how the user could reduce their risk is given and the effect of that change is shown on the thermometer and chart. Thus the user can experiment with possible changes to build up a personal plan for change. As they do this process they are encouraged to request a print out of more detailed advise on each specific area of risk(Smoking, diet, alcohol, exercise).Thus the user learns about their personal risk assessment and the lifestyle change they could make to reduce their risk of CHD . Information on all the risk factors of CHD leads to community knowledge increase and l influences friends and relatives. The chance is given to build a plan of action. Collection of the personalised leaflets reinforces the plan and makes it more likely to continue over time.
The fact that it is all done by themselves also increases significantly the likely hood that changes will be sustained The knowledge that they can come back and repeat the exercise encourages progress and each subsequent use increase the knowledge of CHD of the individual thus increasing the possibility of change.

## 3.Ease of use

The Tutor has been developed to make it easy to use. Non commuter literate user do not feel that are at any disadvantage. The screen choices are kept simple and correction of errors is easy .Sound is used to help less confident. This however is managed so that confidential information is not given out.
The program has been successfully used by the public from age 5 to 87 to our knowledge and recorded evidence from the test site suggests that few fail to complete the full assessment .

## 4. Education methods

**T**he tutor uses sound and colour reinforcement to increase the impact and memory of the information given..
It uses easily recognisable images to make under standing quick and effective eg. high temp=bad, low good, red= bad green= good. All the advice can be entered repeatedly to reinforce learning and is printed in personalised advice sheets on completion(personalisation increases memory retention and you are less likely to discard a personalised assessment).

## 5.Effectiveness

While it is always difficult to assess the effectiveness of education tools the research below suggests not only that user like this form of education but they also made significant changes as a result of using the tutor.

**Results for Touch Screen Tutor research questionnaires 100 unselected users**

| | | |
|---|---|---|
| **Completed questionnaires** | **86** | |
| **Found useful and relevant** | **74** | **86.05%** |
| **Remembered score** | **66** | **76.74%** |
| **Remembered advice** | **64** | **74.42%** |
| **Repeated Program** | **36** | **41.86%** |
| **Collected leaflets** | **62** | **72.09%** |
| **Collect leaflets 2nd use** | **11** | **30.56%** |

**Changes results**

| | | |
|---|---|---|
| **Changed diet** | **23** | **26.74%** |
| **Stopped adding salt** | **14** | **16.28%** |
| **Increased exercise** | **8** | **9.30%** |
| **Reduced smoking** | **5** | **5.81%** |
| **Stopped smoking** | **2** | **2.33%** |
| **Reduced alcohol** | **6** | **6.98%** |
| **Made life style change** | **27** | **31.40%** |

The British Heart Foundation suggest:-

- That each person stopping smoking reduces their heart disease risk by 25%

**The use of the tutor has also received many favourable comments from patients and users**

Anecdotally when the pilot machine was removed from the surgery site for 3 days to go to an exhibition we had 2 complaints from patients as to it absence.

Health service colleagues have told us that using the Tutor has made them change their lifestyles when they were already knowledgeable on the subject.

**3. Repeatability**

The tutor can be returned to repeatedly. Users can reassess their risk and reinforce the education as often as they wish. You can see for the above figures that 40% of user did this. The opportunity to repeat the education exercise when you want to may be an important factor in encouraging lifestyle changes.

**4. Understandable health messages**

The importance of simple understandable messages cannot be over emphasised.

Advertising research as well as opinion of users of CDH prevention systems suggest that consistent advice at all stage increases the recall and effectiveness of the advice. Giving different advice on different occasions leads to a weakening of all the advice given.

The advice messages must be understandable to the user and brief enough that he user will read the information. The group of patients who have the highest risk of heart disease include those which have the poorest education levels. It is therefore important that the information is given in a way these groups can use without patronising the better educated. The advice and the personalised advice sheets printed by the Tutor are designed to meet these standards.

These advice sheets are identical to those in the RISK CHD program used in many GP surgeries (available free to NHS users) thus enabling reinforcement of the message through the community and by a consistent advice throughout the NHS.

**5. Relevance**

The Tutor ensures that the patient receives advice relevant only to their current circumstances. All the on screen advice is targeted at the users personal risk factors. Colour coded screen information is more easily understood enabling the user to concentrate on the changes needed. The advice sheets produced are coded in the same way. This means that all the advice given is applicable to them and they are not distracted by information on risk factors they do not have.

**6.Reduced barriers**

The Tutor allows the prevention message to reach all parts of the community without the barrier of not wanting to

bother the busy health professional. It also allows the timing of advice and learning to be in the control of the user, increasing the likely hood that the widest range of users will be drawn into the life changing process. The personal empowerment of this approach make the intervention more effective.

## What are the advantages of touch screen Tutor over other methods

- It is patient centred, allowing patients to understand the significance of their situation and the changes needed to improve it.
- It avoids the negative reaction to being told what to do and exchanges it for factual advice with a well defined target and clear methods of change.
- As each person has their own combination of behaviour and genetic risk, the information and advice is tailored to that individual and effort is not wasted on areas that do not need attention.
- It is based on sound research from The Scottish Heart Health Work and The British Regional Heart Study. The factor based system from these studies lends itself well to the task of communicating the relative risk of each factor to the patient.
- There are many Psychological barriers that can get in the way of health education including
- Patients not wanting to "bother" a doctor.
- The person needs to be in a receptive state (i.e. thinking of health matters).

The Tutor avoids these by allowing the patient control of when and where.

- The use of a the **MEDCAL CHD Tutor** appears to hold no barriers to any age group or gender.
- The Tutor is cheap to use( cost less than £1 per assessment based on patient use over 3 years).
- The systems offers printed advice sheets according to the answers given by the user. These are printed with the name, gender, date of birth and the date of the assessment. The user is invited by the Tutor to collect the advice sheets that they have produced from a supervised printer to prevent confidential information being give to someone else.
- Creating opportunities for people to become aware of their potential health risks before consulting the doctor is the key to successful prevention.

# How the IT in the Tutor was created

### The development team

The development team consisted of Dr Peter Tyerman(GP) and Matthew Nicholson(programmer)

The clinical support team Dr G Tyerman(GP) ,Dr M Duggal(GP) ,Dr M Burgin(GP)

The admin Support Team M Robinson, J Zuro, A Crowcroft and F Ward

Additional advice from The Family Heart Association , Primary Care Cardiovascular Society ,Dr T Roscoe(Primary care IT Sheffield University) Dr W Rhoden(Consultant cardiologist) and the reception and attached staff at Rotherham Road Medical Centre.

The small development team made it possible for a very focussed approach to the development which is not normally possible in health care systems development, but enabled a very cohesive set of systems.

### The IT itself

The Touch Screen Tutor needed to appear simple despite the complex underlying program required to make the scoring ,assessment and presentation of the results possible. It is important that user forget all about the fact they are using a computer system and just "do it".

We discovered early in the process that the hardware needed for the Tutor was not available at a sensible price. We therefore developed our own solution. To keep this cost effective and to allow for the use of improved hardware as it becomes available we based the system on readily available components, developing an integrated system product.

The hardware consists of a PC, speakers, touch screen, cabling etc. These are housed in a either glass fibre reinforced plastic case designed attractive to users in order to stimulate use. It is robust and stable for use in most indoor environments. A light weight aluminium version is also available.
To this we added a clinical scale from a Swedish company which we were able to convert to computer control using a purpose designed interface. This along with some special software allows the computer to weight the user and place the result into the heart disease assessment program without any action from the user. We have also developed software which allows the same process in a consulting room if desired.
Where as all the programming is done in house, we source all the hardware from local suppliers. We design the housing ourselves to ensure the quality of the end product. The housings are then commissioned from local manufactures.
This system makes sure that the hardware and software always work together minimising the risk of faults developing. This has kept the costs down as well as making new additions possible. The adding of a blood pressure self assessment module is progressing well.

The software design process proved long and complicated. Initial ideas based on standard computer programming techniques produced a program was unsatisfactory.. We therefore developed a user orientated interface based on the natural instinct of the user to touch what they think is right. The development of this user centred interface enables the system to feel completely intuitive . To produce this effect for the user we needed to produce complex software which allows for any type of action from the user to be interpreted by the program Inappropriate action produces a reaction which moves the user to an appropriate action without and apparent negative response.

We program the software using Borland Delphi as this allows for best control of this type of environment and will allow for different operating systems as both Microsoft Windows and Linux versions are available. We think that as we develop this type of programming the increased stability of Linux will make for reliable software and reduce the support requirements of the Tutor at remote sites.

The philosophy of the design is to:-

1.Attract the user.
2.To encourage the first touch.
3.To engage the interest.
4.To maintain that interest and draw the user through the complete assessment.
5.To inform and educate the user in targeted areas where high risk has been identified.
6 To identify those users that are at highest risk and direct them to appropriate health professional whilst priming them for the changes those consultations will suggest.

## Spreading the system

The Tutor has recently been developed from a pilot study test model into a commercially available health education tool for the health service and health education markets.

There are now two models available. A basic Tutor for surgeries etc and a small footprint easily portable model for shows, temporary sites and retail outlets such as pharmacies..

Both models have attended shows over the last few months and have performed over 1000 assessments.
These have been part of Family Heart Associations heart disease prevention and awareness campaigns and their success has lead to plans to include them in a much bigger program through out the country next year.
In a single event in Barnsley over 1000 members of the public were assessed and received personal advice. This making it one of the largest CHD events in the country. At a cost of less than £2500 to stage could reproduced easily throughout the country.

At the request of the specialist advisory implementation group(AIG), as part of the work on the Implementation Plan for the CHD NSF in Wales, Tutors were present at he launch of the Welsh NSF for Coronary Heart Disease This was as a result of the presentation to the AIG of the CHD prevention system of which the Touch Screen Tutor was a Major part.

The system has been assessed by the Welsh Nation Service Framework for CHD with following comment

**"Medcal's RISK system was assessed by a specialist advisory implementation group (AIG), as part of the work on the Implementation Plan for the CHD NSF in Wales. The AIG recommended the system and approach for consideration to the Implementation Plan Steering Board. Board members expressed favourable comments as they considered the system, the touch screen and the approach adopted at Dr Tyerman's practice, and the audit results that were also presented.**

**The Board would like to introduce a risk assessment/patient advice system for use throughout Wales and the Medcal system is currently being seriously considered in that context."**

**Dr Gillian Todd**
**Leader: NSF for CHD Implementation Plan, Wales**
**Thursday, 12 April 2001**
**and request was made that the program be presented at launch meetings of the NSF.**

We were informed that Riskchd and the Tutor would be in the Welsh NSF tool kit but the basis of the tool kit since been changed. The program was presented at the launch of the NSF and the Tutors were demonstrated. Considerable interest shown in installing the Tutors at various site in Wales.

The first basic models are now in service in a walk in centre in Croydon, a PCG in the North east and a pharmacy in the Midlands. Following the recommendation in the Welsh NSF we have received multiple orders from Welsh health organisations and these are now in production. The portable model has also received 5 orders for use at shows conferences etc.

## Future plans for the system

The completion of the development of the 2 models of heart disease Tutors and their success has led to us looking at wider areas of health education where the techniques we have learnt can also be applied.
We are also planning to add BP and exercise self assessment to the Tutors by Jan 200.1

We have with Professor Ruth Chambers of Warwick University started on a project to produce a teenage health education and pregnancy prevention programme based on the knowledge we have in touch screen self assessment and education. Early response to ideas and method seem to be very positive.

We also have plans to develop self assessment of depression and osteoporosis risk as both these are similar problem profiles to CHD. They are therefore likely to respond to similar techniques.

## Things we have learnt

That there is little software available for patient education in primary care and what there is of very variable quality.

That the medical profession has yet to see the advantages of IT in primary patient education and are wary due to the poor quality of IT they have been sold. This is largely not a problem of poor software its self but a lack of understanding between the commissioning agents and the software developers as to what is required.

To develop IT systems to support patient education, rather than the health professional, requires a completely different approach to the programming than record keeping and administration IT does.

That interactive health education is not only acceptable to the patient but also has many advantages that make its use an important additional item in the patient education armoury rather than a replacement of other methods.

### Cost implication of the system

The Tutors costing are such that on the usage we see in our surgery, and this has been matched or bettered elsewhere, each assessment will cost less than £1, a fraction of the cost of most health education programs currently in use.

The annual cost to have CHD Tutor in place is £1200 (5 year expect lifetime). This makes the system extremely competitive with other CHD health promotion schemes which typically cost 3 or 4 time this due to very high cost of health professional time. It also has the advantage of not using health professional time when it is in extremely short supply the Tutor can reduce the strains on the NHS which other CHD prevention systems typically increase. It is confidently expected that each machine installed will pay for itself many times over in NHS time and expense during its life time. A tutor has only to prevent a single heart attack to pay for itself.
As a cost comparison we compared the cost per life year saved of the Tutor compared with other methods of smoking cessation(Smoking cessation guideline and their cost effectiveness THORAX December 1998).
Cost effectiveness estimates(health authority)

Cost per life year saved

| **Face to face interventions** | Cost per life year saved |
|---|---|
| Brief advice(GP) | £112 |
| Brief advice(GP)+self-help(leaflet) | £142 |
| Brief advice(GP)+self-help+ NRT(nicotine replacement therapy) | £173 |
| Brief advice(GP)+self-help+ NRT+smoking cessation service | £164 |
| **CHD Tutor** | **£78** |

The figure for the tutor is based on a 1% smoking cessation rate the survey results above gave a 2.3 % rate which would give a cost per life year saved of £34.

This suggest that as a smoking cessation method the Tutor even when using the conservative rate of 1% is one of the most cost effective methods. If you were to include an allowance for other life style changes then the cost effectiveness would probably become less than £25 per life year saved A figure that few if any other health care interventions can match.

# Conclusion

The results suggest the tutor may well produce significantly reductions in CHD at a very cost effective price. At the same time the cost in NHS staff time is insignificant reduced.
Large scale use of such a method could prove one of the few advances in CHD prevention that could be introduced quickly and effectively given the shortages of nurses and doctors currently available to the NHS.
The Touch Screen Tutors allow communities, employers etc. to invest in high quality health improvement for their area without the complications of trying to find scarce professional resources.

# Information Sheet

Extra informationd=cd drive

CD contents
Summary
d:\itawards\public information\itawardsummary.doc
Main document
d:\itawards\public information\itawardtutor.doc

Appendices

1.Questionnaire results
d:\itawards\public information\touchresults.doc
2.Touch screen photos
d:\itawards\public information\itawardstutors.doc
3.Sample Patient assessment sheet
d:\itawards\public information\itawardsamplepatientadvice.doc
4.Sample Patient advice sheet
d:\itawards\public information\itawarddiet.doc
5Alhambra event
d:\itawards\public information\alhambra.doc

Extra information

For further information on the CHD program and the Welsh NSF you may contact
**Dr Gillian Todd**
**Leader: NSF for CHD Implementation Plan, Wales**
**On 01656753031**

The information given has been limited by the space available but we much more audit information etc.
I enclose with this application a CD with a copy of the application documents in directory c:\ITAwards

The main part of the CD is the Version 5 of the Health Professional software due for launch if December.
To load this please contact MEDCAL for a user number 01142887264 as to enable data links we give each site a unique identification number.

BMP versions of the pictures are available if required.