

An IT Approach to Cardiovascular Care based on Primary Care

M Clarke, RW Jones

Brunel University, Uxbridge, UK

Abstract

We describe a unique telemedicine approach to cardiovascular care, based in primary care, which combines store and forward with real time video. Patients presenting to the family practitioner (GP) with chest pain or symptoms indicative of cardiac disease are assessed within the health centre by exercise test ECG. The report, together with other clinical information is forwarded as an electronic referral to the cardiologist. Suitable candidates for angiography have an initial tele-consultation by video-conferencing, in which not only may the patient, GP and cardiologist discuss the diagnosis and forthcoming procedures in hospital, but also can undertake management of the patient, such as review of medication and life style. Follow-up consultations may be conducted by further tele-clinics. We also show how re-engineering the process has the potential to eliminate 75 of outpatient appointment.

1. Introduction

In the UK, the usual pathway of care for cardiology includes referral for an initial outpatient appointment with the cardiologist, who would then order an exercise test. The patient returns to see the cardiologist after the test has been performed. Each step has associated delay, and a delay of 12 months from initial diagnosis to angiography is not unusual. This is unsatisfactory for the patient and is not in line with UK government targets and guidelines [1].

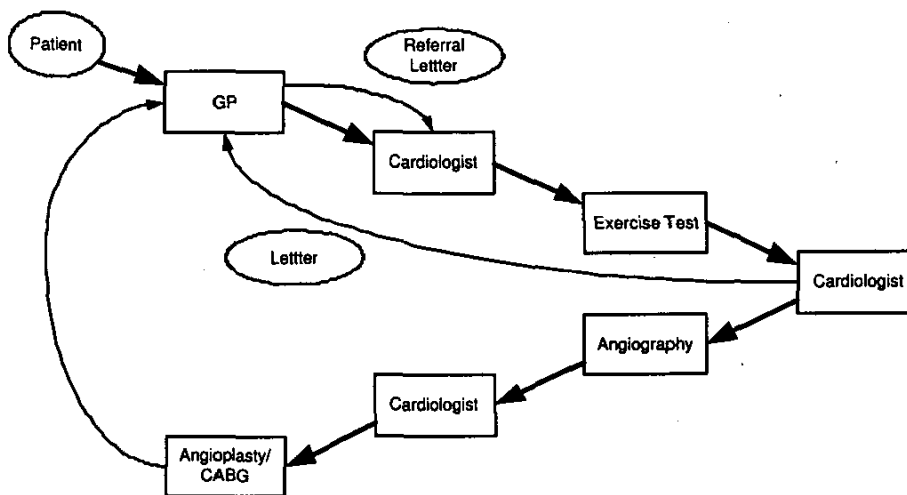


Figure 2. Current pathway of care for cardiology

2. Current pathway of care

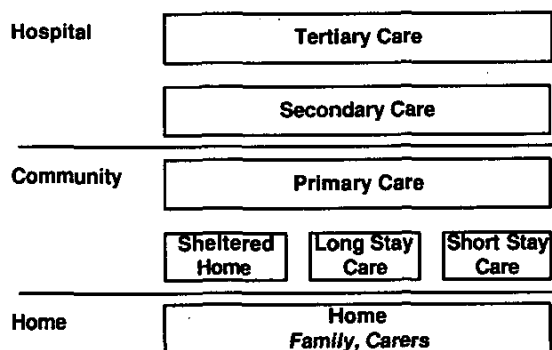


Figure 1. The current hierarchical model of health care

Health care is currently based around the pyramidal healthcare structure devised by W.H.O. In the model of figure 1, patients entering the system at the bottom layer, are referred up through successive layers to seek more specialised care. Although this describes the current picture, it also emphasises the hierarchical structure that has become accepted by many. This reinforces the barriers that are placed between the sectors due to geographic or managerial reasons.

The result is that the barriers prevent communication between sectors. The patients move within the system, but there is no corresponding flow of information. This results in duplication of tests and patients being seen with no information.

Figure 2 shows the typical pathway of care for the UK. The patient presents with chest pain to the GP, who refers the patient to the cardiologist. (solid arrow). Usually a referral letter will be sent in advance of the outpatient appointment, but it may contain little information beyond reporting the presentation of chest pain. Without further tests, the cardiologist is able to do little, and usually the patient will be given an appointment to return to have an exercise test. Following the exercise test the patient returns to a second outpatient appointment. Only at this point can a decision be made to refer the patient to angiography. It is quite common for 50% of patients to have a negative exercise test and the symptoms to be non-cardiac in origin.

3. A telemedicine approach

Others have suggested inverting the pyramid and making the patient the centre of the system. The model suggests that those at the top seek support from those lower down the pyramid. However, the model is still hierarchical, and is unlikely to work in practice. More importantly, it does not describe an ideal model.

We have chosen, instead, to adopt a peer based model, figure 3, where all areas of health care are viewed as possessing niche specialist skills. ICT supports communication between any, and all, sectors as appropriate for the management and care of a patient. Furthermore, the model should be seen to wrap around from tertiary care back to primary care, and there exists a continuum of care.

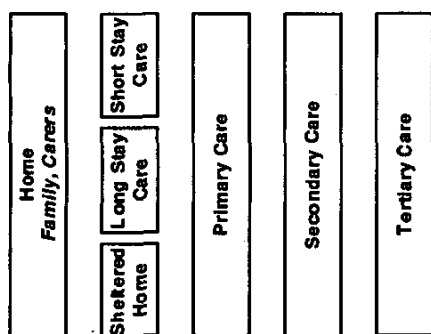


Figure 3. A peer based model of health care

In our remodeled process, figure 4, when the patient presents with chest pain, an exercise test is arranged and performed in the health centre within days and the exercise test report is forwarded to the cardiologist, together with any other pertinent information, as an

electronic "evidence-based" referral. Having the evidence, the cardiologist is able to make the diagnosis and, more importantly, prioritise when the patient should be seen.

A teleclinic, using videoconferencing, is arranged to bring the patient, cardiologist and GP together to discuss the diagnosis, the management of the patient and prepare the patient for subsequent stages of investigation and intervention.

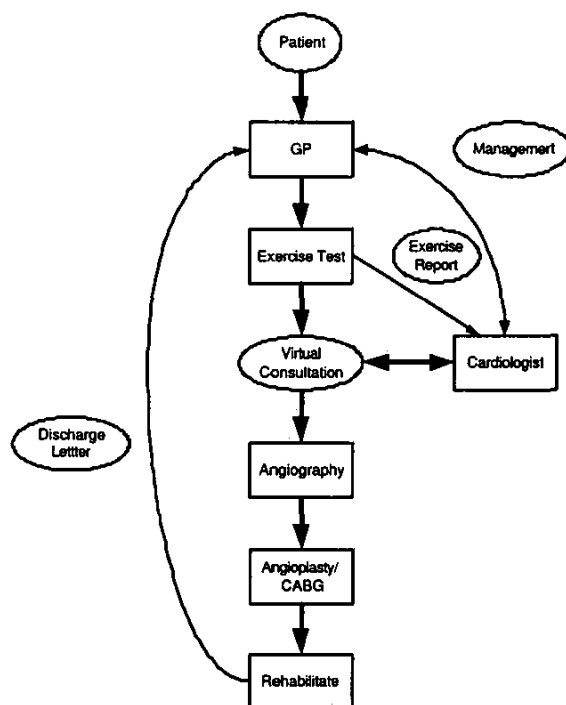


Figure 4. Pathway of care using the telemedicine approach

4. Results

Our models for IT mediated patient pathways eliminate the first outpatient clinic of the traditional model. Furthermore, it can often be the case that more than 50% of patients in an outpatient clinic have been inappropriately referred. Having the evidence-based referral removes the need to see these cases, giving potential for a reduction of 75% in outpatient clinic appointments. In addition, having the evidence, we have found that the consultant is; better prepared to deal with the patients, sees only those patients with a problem, can prioritise on need, and uses their time significantly more efficiently.

Careful planning of the teleclinics makes them an efficient method for consultation. Having the

cardiologist, doctor and patient, and electronic information allows the cardiologist to gain history rapidly and more completely. The patient can be prepared for examination in advance, making further efficiency saving's on the consultant's time. Our teleclinics have a mean duration of 10 minutes, compared to an equivalent outpatient clinic of 15 minutes. Post analysis of video recordings of each consultation is giving opportunity for further improvements in effectiveness.

The most significant change in our approach has been to make management, and not diagnosis, the focus of the teleclinic. For this reason we use a data/video system. Figure 5 shows the cardiologist and doctor looking at the exercise test result (positive in lead 5) and discussing a more effective drug therapy whilst the patient waits for angiography. At this point in the consultation the video is reduced in size and importance, the emphasis is on information.

brings together healthcare professionals working in community, primary care and secondary care, to collaborate. This can impact greatly on care, for example, it brings together the cardiologist and doctor, who are able to determine the most appropriate management for the individual patient. This way of working truly supports continuity of care for the patient, from primary to secondary and return to primary care.

We also observe significant educational value for each of the participants, especially during the teleclinics. New skills and practices have been learnt and others improved.

Our methods are easily extended, and we have ambulatory monitoring for E.C.G. and blood pressure. Once again the aim is to acquire diagnostic information in primary care and an evidence-based referral is sent to the consultant.

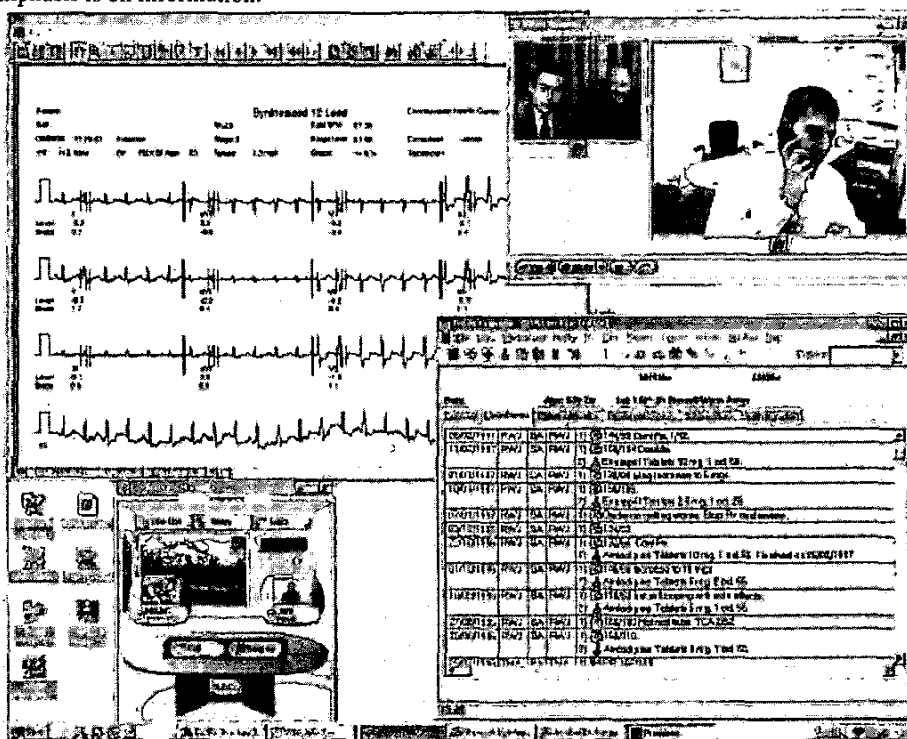


Figure 5. An information based approach to teleclinics

We also see that referral time for intervention is significantly reduced. Having an exercise test system locally allows exercise tests to be performed within a day of presenting with symptoms and the report can be sent to the cardiologist immediately. Those with significant change in the E.C.G. can be admitted for investigation by angiography immediately and treatment can follow, the whole procedure taking less than a week.

The virtual team has been particularly successful. IT

Patients are delighted. Urgent cases are diagnosed and seen more quickly. All are supported through the consultation by the local health professional.

5. Discussion

Our expectations for the benefits in the use of technology to support health care are significant. Certainly, technology to undertake non-invasive diagnostic procedures in primary care is available off the shelf for many other medical areas than those we have

investigated. However, we found that training to use new equipment effectively is an issue, as is the need to maintain a satisfactory skill level in the use of that equipment.

However, the single-most lesson that has been learnt is that the introduction of IT has a profound effect on the relationship between health-care professionals. IT effectively removes the barriers of hierarchy, distance and time, and can bring together anyone from any part of the health care organisation. Our model assumes that each healthcare professional is a specialist with a high level of skill. Such a view impacts on the professional relationship between people in the different sectors and their roles, both from their own perspective and from that of others. People must be organised to work in teams, rather than in isolation. This demands a significant change in the way of working and attitude.

It is also clear that new skills must be introduced into primary care. One of the most important skills must be

change management. This should not be underestimated.

References

- [1] National Service Framework – Coronary Heart Disease.
<http://www.nclh.nhs.uk/nsf/chd/nsf/main/mainreport.htm>
last accessed 18/9/03..

Address for correspondence.

Malcolm Clarke.
DISC
Brunel University
Uxbridge
Middlesex
UB8 3PH
UK.
malcolm.clarke@brunel.ac.uk