CardioConsult AF
integrated care for
the patient with Atrial Fibrillation

The Atrial Fibrillation Outpatient Clinic
supported by CardioConsult AF

a description of the outpatient clinic concept by
Robert Tieleman & René van Dijk, cardiologists and current chairman of Content Board and EPF consultant, respectively
Introduction

The Atrial Fibrillation outpatient clinic model is designed to permit the maximum amount of task delegation in a responsible manner. CardioConsult AF, a disease management system for integrated care for the patient with Atrial Fibrillation, was developed on the basis of this model, and includes:

- A sophisticated system with integrated national and international guidelines, which advises and supports the practitioner in diagnosis and treatment
- An Electronic Patient File (EPF) specifically designed for the care for people with Atrial Fibrillation
- Tools for recording and reporting
- An integrated Telecare module and alert system.

CardioConsult AF was developed for use by paramedics with the specialist fulfilling the role of supervisor. It allows:

- The specialist to retain control of the treatment and care of a large and annually growing patient group, with less time investment
- The quality of care to be made transparent, because all desired processes and performance indicators can be presented with a single touch of the button
- Chain care to be facilitated, if required: general practitioners, nurse practitioners, and other care workers can all use the same file.

Figure 1 offers a schematic overview of the outpatient clinic model. Here you see that the concept can be divided into three phases: the first, second and finally the third and subsequent consultations. The concept is best described by following a patient through the process.

Figure 1: Summary of the outpatient clinic model
Prior to the first consultation

When the patient makes an appointment, the possibilities of filling in the Digital Auto-Anamnesis (DAA) are discussed. This questionnaire is part of the Atrial Fibrillation EPF and consists of a number of validated questionnaires. It offers valuable information to the practitioner. The DAA is filled in by the patient. There are a number of options for doing this:

- Via the Internet: the patient is sent an email containing a hyperlink from CardioConsult AF and fills in the DAA at home (obviously the completed Web DAA is given a secret code in connection with privacy)
- On a computer at the hospital, prior to the first consultation
- If the patient is unable to fill in the questionnaire on a computer, there is also a paper version, with a secretary entering the answers in CardioConsult AF.

The questionnaire consists of approximately 100 questions. In many instances, the patient does not need to answer all the questions because parts of the questionnaire are skipped depending on the answers given. Filling in the questionnaire takes approximately 30 minutes.

---

The DAA includes the following questionnaires: SF36 (QoL), AFSS (severity of complaints), HADS (fear/depression), MMSA (medication adherence), Rose questionnaire (AP), EHRA, lifestyle, smoking e.g.
First consultation
Main aim: inventory

The patient reports to reception. The secretary checks to see whether the Digital Auto-Anamnesis (DAA) is already available. If the Web DAA has been completed, the answers are downloaded from the Internet. If not, then the patient can fill in the DAA on a computer at the hospital or the answers are entered from the paper DAA.

The nurse or nurse practitioner inspects the patient's records before the patient enters the consultation room and sees the scores from the questionnaires (Figure 3).

![Figure 3: The presentation of the answers of the DAA](image)

The nurse or nurse practitioner can see at a glance where the patient's functioning deviates negatively from the norm and also whether any symptoms were reported that could be relevant to the syndrome. This enables him/her to prepare specific questions about the patient's medical history, which need to be asked once the patient is in the consultation room.
The nurse or nurse practitioner also views the data entered in the Electronic AF file by the secretary before the consultation (Figure 4).

![Figure 4: EPF screen shot](image)

The patient is now collected from the waiting room and the nurse or nurse practitioner can immediately start asking the extra questions for the anamnesis. After these have been asked and the answers entered, the patient then undergoes an extensive physical examination. This is done according to a fixed system. While the patient is busy dressing, the associated screens in the program are completed (Figure 5).
Figure 5: One of the screens in which the physical examination data can be filled in.

After all data have been entered, the program then indicates what additional tests have to be requested for this specific patient. There are several layers of recommendations in the program. The deepest layer is where additional tests are dictated by the guidelines implemented in the program. Recommendations from the Content Board[^2] constitute the next recommendation layer. The local Administrator (supervisor of the outpatient clinic) can also enter additional recommendations. The origin of the different recommendations can be clearly seen on the screen. If the user decides not to follow a recommendation from one of the higher layers (Guidelines, Board, Administrator), then a reason for that must be given. In this way it will be possible in the future to examine how guidelines are dealt with in practice.

The patient is informed about the various additional tests that are proposed, the appointments are made at the reception desk as well as a follow-up consultation.

NB: At this stage the expert system is already very alert to attaining anticoagulation in proven Atrial Fibrillation. If, based on the guidelines incorporated in the program, there is an indication for anticoagulation the user’s attention is drawn to that at this stage. The program also makes a recommendation about suppressing the ventricle frequency in the case of rapid ventricular sequelae with Atrial Fibrillation.

[^2]: The Atrial Fibrillation Content Board consists of the following members:

Prof. H.J.G.M. Crijns, cardiologist (Maastricht University Medical Centre), chairman; Dr. R. Tieleman, cardiologist (Martini Hospital Groningen), vice-chairman; J.H. Bennekers, cardiologist (Martini Hospital Groningen); Dr. H.A. Bosker, cardiologist (Hospital Rijnstate, Arnhem); Dr. R.B. Van Dijk, cardiologist (Cavari Clinics Groningen); W. Eijgenraam, nurse practitioner (Martini Hospital Groningen); Prof. I.C. van Gelder, cardiologist (University Medical Centre Groningen); Dr. C.J.H.J. Kirchhof, cardiologist (Rijnland Hospital Leiden); Dr. J.G. Meeder, cardiologist (Viecuri Medical Centre Venlo); M. Schools, cardiologist (Medical Spectre Twente, Enschede).
Second consultation:
Main aims: determination of the Atrial Fibrillation profile\(^3\), determination of the treatment plan for Atrial Fibrillation and any observed risk factors

A doctor is always present during the patient’s second consultation. Preferably this is the supervisor of the Atrial Fibrillation outpatient clinic. Together with the nurse or nurse practitioner, the results are reported to the patient and a summary is shown of the different risk factors, if necessary.

![Figure 6 An example of an AF profile](image)

Next a treatment plan is suggested to the patient. The following matters can be included in the treatment plan: anti-coagulant therapy, rate control, rhythm control, lifestyle training, ceasing smoking, treatment of high blood pressure, excess weight. Motivating the patient is also an important aspect of this consultation. In addition the patient is told that the nurse will be the contact person from then on and that this person will treat the abnormalities found in accordance with the guidelines, where applicable.

\(^3\) In practice too little attention is paid to the careful classification of the patient in the correct profile. On the basis of current guidelines the Content Board distinguishes 22 profiles, which may call for different therapeutic approaches.
Third and subsequent consultations:
Main aim: Integrated counselling and treatment of the patient with Atrial Fibrillation

Depending on the patient and his/her profile, the patient will be seen more or less frequently for adjustment of the treatment. This will be mostly guided by the expert system. Where necessary the patient can be monitored by means of Telecare.

Performance indicators

The following performance indicators will apply as of 1 January 2012:

- Was CHA₂DS₂VASc score used?
- Was the case dealt with according to the outcome?
- What was the average INR?

These data can be easily retrieved from the data set and shown in synoptic graphs by the administrator himself. This also applies to other performance indicators to be determined by the Content Board.

How does the model described relate to other models?

It is the only Disease Management Care model for patients with Atrial Fibrillation in the world that enables smart ICT to arrange the treatment and care with maximum efficacy. By integrating the guidelines in an expert system and an EPF, the patient is treated according to the guidelines. The supervisor can deviate or allow deviations from the guidelines, for example when CardioConsult AF gives a warning at any time during the process because problems are occurring. The reason for deviating from the guidelines is recorded in that instance.

The model has been mainly designed for setting up a productive outpatient clinic; the customised ICT solution thus developed also facilitates scientific research. Due consideration has been given, with the initial data collection, to characterisation of the population for the benefit of scientific research. Scientific trials can be conducted easily within the AF outpatient clinic concept. The EPF replaces the traditional paper CRF. Last but not least, a trial monitor can recommend which patient is suitable for inclusion in certain trials.

New developments

As of mid-2012, CardioConsult AF includes an integrated Telecare solution. Measurements of weight, blood pressure and also any ECG recordings taken of the patient at home thus form an integral part of the patient file in CardioConsult AF. Measurements received are checked immediately and the system automatically warns the practitioner by text message or e-mail if set limits are exceeded.

In the context of the patient with Atrial Fibrillation, this is ideal for those patients in whom rate control is the focus and medication still has to be adjusted, for patients with hypertension or for patients with paroxysmal Atrial Fibrillation that they themselves cannot easily detect, for example. Because all home measurements are immediately visible in the EPF it is possible for the practitioner to interact rapidly if there is an indication to do so.
Figure 6 An example of the presentation of an ECG in the Electronic Patient File: summary and entire recording.