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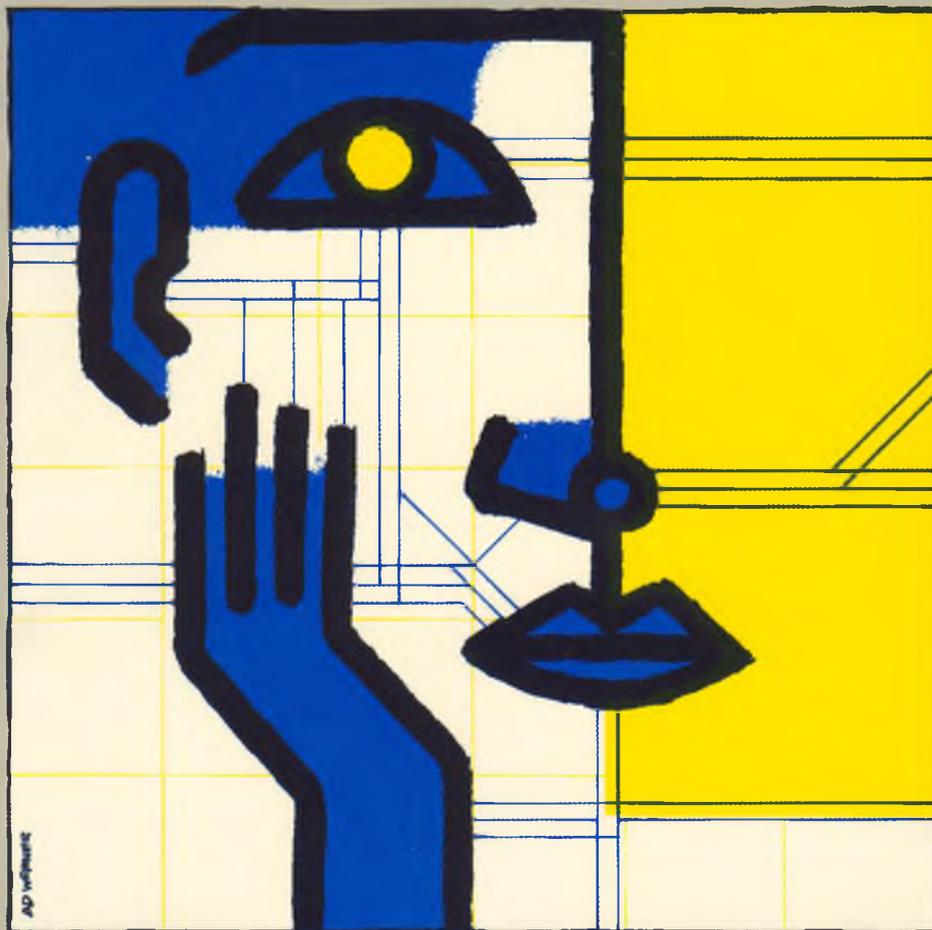
Future of Patient Records

CARE FOR RECORDS FOR CARE
AN APPRAISAL OF THE PRACTICALITIES OF ELECTRONIC PATIENT RECORDS

Proceedings

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Electronic obstetric record:
an efficient application of the hospital
information system

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INTRODUCTION

In November 1994 the Obstetrics Department of the Academic Hospital Rotterdam has moved from the main hospital Dijkzigt to the new children's hospital Sophia, approximately 1 km away from the Outpatient Clinic and from the Gynecologic department. When it became apparent that this would happen, it was also obvious that it would create logistic problems with paper records: they would not be available where needed, also not when a woman would be admitted in labor. This led to the simple question, of the obstetrician to the experts of the Automation Department, if it would be possible to record all data of pregnant patients in the hospital information system (ZIS), so that the data would be available on each location either on screen or as a hard copy. In close cooperation between clinician and programmers, the requirements of the system were defined and subsequently developed, with support of BAZIS (Leiden, Netherlands). The aim was to provide an efficient tool in patient care, that would allow the doctor to save time despite the fact that he/she would have to put in the data on line him/herself. Goals of secundary importance were improvement of management, research, and teaching. Since April 1993 all 30 obstetricians and residents of the Academic Hospital Rotterdam use the Electronic Obstetric Record (EVS) in the outpatient department, to document history, physical examination and check-ups during pregnancy. The EVS has been conveniently linked to other ZIS-applications, including AFSPRAAK (appointments), PATIENT (letters, laboratory results) and KNAP (ultrasound results). The EVS has been well accepted by the doctors as well as their patients, despite the sometimes emotional content of the information. It has improved efficiency in the office and it has made the information available in the high-risk clinic and the delivery ward. It is currently being expanded to allow documentation on labor, delivery and the newborn, as well as information on patients admitted to the hospital because of pregnancy complications. Expressed differently, the EVS is gradually expanding to a complete electronic obstetric record.

THE OUTPATIENT CLINIC

In the outpatient clinic, paper records were often missing, and preparations for appointments were often labor intensive. With the use of AFSPRAAK (appointments), all patients that a doctor will see one morning or afternoon are listed on screen; it is indicated for each patient if that patient has an existing electronic record

(gynecologic patients and new obstetric patients do not have one). General information on name, date of birth, identification number, address, general practitioner, etc. are known in ZIS for each patient. For each new obstetric patient the doctor uses the keyboard to fill out on screen 1 general information on previous children, last menstrual date, etc.; the computer calculates the term date and creates for all following screens a heading which summarizes some of the most important information. On screen 2 the obstetric history is listed in greater detail, largely as free text. The information is summarized in History, before the next screen appears. Screen 3 askes for preexisting illnesses and current pregnancy problems, to be answered as normal/abnormal; if abnormal a box appears automatically to allow the recording of free text. Some crucial information, e.g. on allergies, is automatically selected for the Overview, other information can easily be selected for the Overview if the doctor wishes to do so. Screen 4 allows the reporting on physical examination analogous to screen 3, and asks if a primary medical indication for hospital delivery exists. If so, this information is again automatically selected for the Overview. Screen 5 allows the well-organized documentation of serial obstetrical check-ups: date, calculated gestational age, weight, blood pressure, fundal height, fetal position, fetal heart rate, and free text. Also one can mark laboratory testing, ultrasound, hospital admission and/or interval to next check-up. If marked, a box appears to ask for further details. For laboratory testing, this needs further expansion to make paperwork by the nurse and the lab redundant; for ultrasound and admission it allows assignment of diagnostic categories. For the next check-up, the system instantaneously suggests - through AFSPRAAK - a date and time, which the patient can either accept, if convenient, or not accept, in which case she needs to see a secretary at the desk. At each point in the EVS one can call up the other EVS screens, lab or ultrasound results, or the print function. More importantly, however, at each point in the EVS it is possible to call up Reminders, which allows the recording of free text which will be displayed in the Overview.

When the patient comes for the next check-up, the EVS starts with the Overview, which contains all the automatically selected important information, as well as the Reminders which the doctor thought were relevant. This condensed information is important to refresh the doctor's memory or to bring rapidly up to date the colleague who will see this patient for the first time. Following this Overview, the EVS searches the ZIS for lab and ultrasound results since the previous visit and displays this, so that the doctor is forced to notice the new results. The EVS then moves to screen 5 for documentation of the current check-up, as previously described.

This first part of the EVS was implemented for general use in March 1993. The program is user-friendly enough so that it can be used after approximately 2 hours of introduction. It is rapid enough not to slow down the work in the office for the intake of new patients (20 min) and it actually saves time on subsequent check-ups (10 min) as compared to working with paper records. All doctors have lost their diffidence with regard to the keyboard and screen in direct patient care.

CURRENT DEVELOPMENT

Two important extentions are currently being tested. First, after each initial visit a letter is sent to the referring general physician, midwife, or other specialist. A standard letter is made up from building blocks within the EVS, including Reminders and all items selected for the Overview. The letter has been tested as good, but the coupling with PATBRIEF, containing address files, etc. has taken some time. Once implemented, this will further reduce administrative time. Second, labor and delivery are an administrative burden to the obstetrician. It requires not only the documentation in the patient record, but also reporting to the National Obstetric Registry (LVR) and to the referring physician. Electronic data input allows automatic output through various channels. The electronic labor and delivery record is currently being tested. It starts with screen A, reason for admission, how labor started; the number of fetuses is drawn from the ultrasound results, if available. Next are the number of possible events: vaginal exam, cardiotocogram, interpretation, microblood analysis, medication, newborn, and after birth. All contain a serial set of data, most of which are analogous to EVS-screen 5 (check-ups). This allows easy recording and display on a time-axis, either event-independent, or for each event individually. For each newborn information is recorded including name, sex, weight, size, condition, way of delivery, obstetrician in charge etc., as well as the patient identification number of this baby, which allows coupling with the neonatal record. The data are used to create automatically a letter to the referring physician, the hospital delivery registry, and a report to the National Obstetric Registry. We hope and expect that, implementation of this second part of the EVS will reduce the administrative burden on doctors and secretaries.

FUTURE DEVELOPMENTS

To make full use of the electronic obstetric record, that contains information on pregnancy, labor, and delivery, a financial account and codes from International Code of Disease Registry (ICD 9 or 10) should also be automatically derived from the data. The financial part has meanwhile been defined. The ICD coding system is cumbersome; thus far we have not defined the coupling. Of greater importance to us is further expansion of the EVS for use in patients admitted to the hospital for pregnancy complications. This part has been defined, including protocols for the standard treatment of common diseases, but awaits programming.

Although the electronic patient record was designed primarily to help the doctor by improving the efficiency of patient care, it obviously also offers improvemnent of patient-related research. Both prospective and retrospective studies require the recording of data according to protocol. The researcher must have easy access to the data to allow interactive data-analysis. The doctor will be convinced to change his pen for a keyboard if the electronic medical record works better in day-to-day patient care than the old paper record. If automation shows that it can adjust to the doctor's wishes, then the doctor will be only too happy to use the advantages of the electronic medical record.