Better Patient Care -- Through Electronics

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Boston Children's Hospital, the first institution in the country to employ a computer in bed scheduling, has its second application on line, a precise scheduling plan for clinic patients.

BETTER PATIENT CARE — THROUGH ELECTRONICS

by Robert M. Smith

THERE ARE three major differences between the public outpatient clinics in even the best hospitals and the medical services available through a well-run doctor's office:

The inordinate waits that clinic patients must go through before seeing a doctor at all;

The cheerlessness, and the jammed conditions in which patients must wait to see a doctor;

The fact that most patients seldom see the same doctor twice if they must visit the clinic more than once. Just as patients are taken on a first-come, first-served basis, so the first available doctor gets the next patient waiting even though the patient may have seen an entirely different physician on his last visit. This of course aggravates the time delay since the new doctor must review the patient's entire medical record before treating him.

In an effort to cure all these maladies, The Children's Hospital Medical Center in Boston, which runs one of the country's busiest and best medical clinics, has taken two simple steps that are restoring to some degree the atmosphere of a private patient-doctor relationship for its clinic outpatients.

And if Boston Children's can do it, presumably any hospital can; an average of 40,000 patients make 150,000 visits a year to its 54 clinics.

It is accomplishing this plan, aimed at giving a more human dimension to clinic visits, through an unlikely but effective means, an electronic computer.

Boston Children's was the first hospital in the country to use a computer successfully for bed utilization control—determining on a real time basis how many beds are

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available in all parts of the hospital. (See "How to Automate a Hospital," M/S July-Aug., 66, p. 48.) At a time when many hospitals were announcing grandiose schemes for computers to take over much of the paperwork necessary in a hospital, Boston, through its own staff, advised by information systems specialists from Cresap, McCormick and Paget, international management consulting firm, put into effect a simple system based on a central on line computer linked to cathode ray display tubes at the Hospital's admitting offices and nursing stations. By a system roughly analogous to an airline's passenger reservation system, nurses could notify the computer immediately whenever a patient was discharged, or transferred. The computer's memory would be immediately updated. The admitting clerk, whenever a patient appeared, could immediately determine whether a bed was available by querying the computer and receiving a reply on her cathode ray screen.

Admission process speeded

Patients were admitted faster; nurses, instead of laboriously preparing bed space changes manually once a day, could simply key in a few changes on a Teleregister unit at the nursing station.

It was a simple process and in its very simplicity lay its success. By not attempting to do everything at once, Boston got one very important application running smoothly and efficiently. But even then, the Boston planners and their consultants had a schedule for further computer applications designed to improve patient service.

The next successive step was scheduling service for outpatients in the Medical Center's 54 clinics. This was a more difficult problem than bed utilization because of the size of the patient load, and the scheduling of doctors. Hospital nursing and clerical personnel assigned to the clinics were no problem; their hours and availability were known factors. Private doctors who volun-
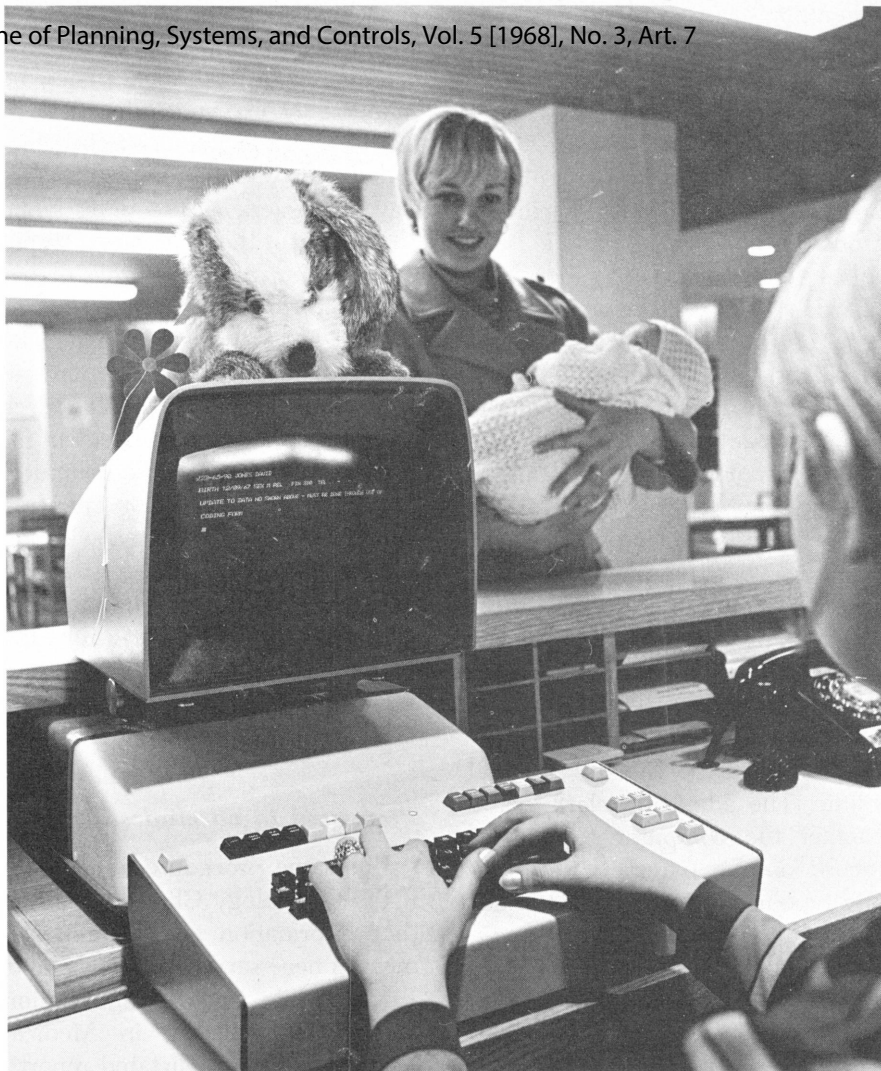
Stuffed toy dog and paper flower decorate the cathode ray tube in one of the hospital's clinic reception areas. The grim, colorless "clinic" look is deliberately avoided wherever it is possible.

teered some hours of service were another problem, though; the hours they donated were their own choice, and occurred at odd times throughout the schedule. Too, demands upon residents made scheduling them difficult.

Reservation plan model again

The approach to the new problem was a more elaborate version of that taken with bed utilization: adaptation of the basic airlines reservations system. The goal was to put each outpatient clinic on the same basis as a private doctor's patient, so he had a definite time for an appointment ideally and would always see the same doctor unless a specialist in some other field were needed.

The basic differences from bed utilization were the closer time factor--patients now had to be scheduled by fifteen–minute or half-hour time intervals within a given day--and the greater number of individuals, both doctors and patients, involved.

The success and speed of development for the new program were immensely aided by the experience Children's had already gained from its bed utilization system and by a federal grant of $668,000 made to help the new development after the bed utilization scheme had been observed in operation by government administrators.

Children's Hospital still has the IBM 360 which was first used (and is still being used) for bed utilization records. But for the clinic

scheduling system a larger–scale Honeywell Model 1200 computer has been installed.

The Teleregister units used at the admitting office and nursing stations in the bed utilization plan have been replaced in the clinic by Honeywell CRT (cathode ray tube) terminals with input keyboards. Actually, these are the same type of units as the Teleregister machines, although the keyboard has been changed slightly for the clinic scheduling application.

The way it works now is this: A patient comes to the clinic for the first time with his parent or parents. Say the child is not apparently seriously ill but displays a lassitude which seems unnatural. The parents want to find out what is wrong.

The clinic general admitting office would schedule such a patient to be seen in the General Medical Clinic. The admitting clerk would contact the computer to open a record on the patient and manually type in on the keyboard of her CRT unit the patient's name, sex, the appointment function, the date, and the clinic to which he is being assigned. The computer would record this information, assign the patient a number, and display all this information on the cathode ray tube display screen. It would also show the next free time slot on the General Medical Clinic schedule.

The appointment is made.

When the patient returns for his appointment—if there must be a time interval—he need no longer go through the main reception area on the first floor of the clinic building. He has an appointment now at the General Medical Clinic and, after paying his clinic fee, goes directly there. General Medical has its own reception area—as do each of the other 53 clinics. The reception clerk there has an appointment schedule for the day prepared in advance by the computer. Such and such a patient has an appointment at 10:30 A.M. with Dr. Jones. The patient arrives and is examined by Dr. Jones, who suspects a heart malfunction. The doctor wants the child to be examined by a cardi-

ologist. He asks the patient's parent to stop at the reception area for another appointment. Then he contacts his own reception desk to say he wants his patient to be scheduled for examination in Cardiology. The clerk at the desk, while the patient is there, presses a "function" button of the console of her CRT unit for the next available free time at the Cardiology Clinic. The computer flashes back the next 40 dates that are available. The clerk selects the date most convenient for the patient's parent. The computer responds by displaying all free clinic times, from which a selection is made. The clerk then keys in the patient's medical record number— his main identification for the future—and the chosen time, and sends it back to the computer.

The second appointment is made.

Plan used in all clinics

The same procedure is followed if the Cardiology Clinic wants further information and an appointment is necessary in another clinic.

Meanwhile a patient information file is accumulating in Medical Records, to which dictated reports, lab test results, etc., are sent from the clinics. Each time the patient is scheduled for an appointment in any of the clinics, the computer prints out the patient number, with the clinic for which he is scheduled, and the date of the appointment. All patients scheduled for each clinic are listed for two days in advance. The medical records library pulls all the records for each clinic number and ships them to the designated clinic by conveyor belt. If an X-ray print is requested, Radiology follows the same procedure.

Thus, if our hypothetical child patient should receive a clean bill of health from Cardiology and other clinics in which he was seen and be returned to his original doctor in the General Medical Clinic, that doctor, Dr. Jones, would have a complete medical history including his own findings and recommendations, and the findings

of Cardiology and the other clinics, before he saw the patient again. And even after all the intervening clinics, if the patient were returned to General Medical finally, it would be Dr. Jones he would return to. For the doctor's name is part of his medical record now; the first doctor he sees is in effect his private doctor as long as he is being treated at that clinic at Children's Hospital.

The same system works for children who do have their own pediatrician but who are referred to the outpatient clinic for specialized diagnosis or treatment, except that in this instance, of course, the child can be seen directly in the appropriate clinic.

The scheduling system takes care of the main objectives of the hospital administration — establishing personal patient-physician relationship and eliminating the endless waits that are so characteristic of so many clinics. What about the drab, cheerless environment and the packed, uncomfortable wooden benches that are almost a clinic trademark in most hospitals?

Here Children's Hospital has been lucky. It has a brand new $12,000,000 building, the Fegan Memorial Outpatient Center, to house its clinics. The Fegan Building was designed with the children who were to be its clients in mind. The street floor houses the main reception area but each of the clinics on the other 10 floors of the building has its own reception areas as well, just as a private physician has a waiting room. Each reception area boasts comfortable, cushioned chairs, bright colors, and even blackboards for children to scribble on while waiting for their appointment.

The child's only contact with the computer, which in a very real sense is guiding him through the Children's Hospital clinics, comes from the CRT unit used by the receptionist. The CRT set looks almost exactly like the television set familiar to him at home except that instead of cowboys and Indians, the set merely shows green type characters. And even the television-like

OPERATOR GUIDE - ADMITTING TERMINAL   CLINIC SCHEDULING SYSTEM

STEP	ADMIT	CANCEL CLINIC	CHANGE CLIN. SCHEDULE (COLUMN HEADINGS)	UPDATE PATIENT INDEX RECORD	INQUIRY-PT. RECORD/ CLINIC STATISTICS
1	PRESS CLEAR	PRESS CLEAR	PRESS CLEAR	PRESS CLEAR	PRESS CLEAR
2	PRESS ADMT	PRESS CNCL CLIN	PRESS CHG SCHD	PRESS UPDT REC	PRESS ?
3	ENTER MED. REC. NO. - IF KNOWN NEW-PT. NEVER HERE OLD-PT. HERE BEFORE - REC. NO. UNKNOWN	ENTER CLINIC NO. AND DATE	ENTER CLINIC NO. DATE AND PAGE NO. **	ENTER MED. REC. NO.	ENTER MED. REC. NO. OR CLINIC NO.
4	PRESS TRANSMIT	PRESS TRANSMIT	PRESS TRANSMIT	PRESS TRANSMIT	PRESS TRANSMIT***
5	PRESS HOME	VISUALLY VERIFY NAME OF CLINIC AND DATE OF CANCELLATION	VISUALLY VERIFY CLINIC, NAME AND DATE	VISUALLY VERIFY PATIENT INFORMATION	
6	USE STEP KEY OR SCAN KEY TO MOVE ENTRY MARKER TO FIRST TYPING POSITION	PRESS CNFM	UPDATE COLUMN HEADINGS	ENTER NEW OR CORRECT DATA	
7	ENTER NEW OR UPDATED PATIENT INFORMATION ACCORDING TO FORMAT ON SCREEN	PRESS TRANSMIT	VISUALLY VERIFY UPDATED INFORMATION	VISUALLY VERIFY UPDATED INFORMATION	
8	VISUALLY VERIFY INFORMATION ON SCREEN	NOTE OK ON SCREEN	PRESS TRANSMIT	PRESS TRANSMIT	
9	PRESS TRANSMIT		NOTE OK ON SCREEN	NOTE OK ON SCREEN	
10	NOTE OK ON SCREEN AND MEDICAL RECORD NO. *				

* IF INITIAL ENTRY WAS NEW - NEWLY ASSIGNED NO. WILL BE SHOWN
   IF INITIAL ENTRY WAS OLD - DUMMY NUMBER WILL BE SHOWN
** IF PAGE NO. UNKNOWN, ENTER PAGE 1 - IF COLUMN HEADING TO BE CHANGED DOES NOT APPEAR ON PAGE 1, CLEAR SCREEN AND REPEAT PROCESS, ENTERING PAGE 2, ETC.
*** CAUSES PATIENT INDEX RECORD OR CLINIC STATISTICS TO APPEAR ON SCREEN AND REMAIN UNTIL CLEARED BY OPERATOR

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This is reference guide sheet furnished every clerk.

Personnel have all been trained in the new system since the beginning of the year; guide sheets and visual checks of data entered in computer keep error rate low.

set is made a little more interesting by the cheerfulness of the receptionists. One has fashioned a paper flower which decorates her unit; another has gone her one better; her unit has flowers and a stuffed animal decorating it.

Personnel manning the reception desks are clerks, whereas in its previous bed utilization system the hospital had to depend heavily on nursing personnel to keep its records up to date. The clerks have proved easier to train on the CRT units than the nurses did, according to Jeanne Colt, R.N., Associate Director of Nursing for Systems, Children's Hospital Medical Center. Nurses do not like keeping records, when the job is simplified to the punching of information on a Teleregister, she believes, and they are apt to resent the necessity of recording information immediately if their nursing duties must be delayed. Clerks on the other hand are fully familiar with keyboard machines and can be trained on the CRT units in a comparatively short time.

Clerks trained in month

Children's Hospital trained its personnel at the reception desks in about a month's time for the new scheduling routine. Clerks were trained through a simulation program on the computer; they would type in dummy information; the computer would make its response on the basis of assumed information already programed into it.

Miss Colt emphasizes there was no effort to make each clerk an expert in the entire system. They were taught the fundamentals of what they were to do and the theory behind the whole system. Then they were given a brief guide sheet to refer to for procedural steps if they forgot any of them and a more extensive manual describing the whole system in detail, which they could refer to at any time.

With this seemingly simple approach to training its clerical workers, the outpatient clinic managed

to start the system in its least busy clinics within a month or so after training started. To date, since training began in early February of this year, Boston has prepared about 75 clerical workers to handle the CRT units.

As for the computer itself, the Medical Center already had trained EDP personnel from its past experience with the System 360.

So far Children's has written 38 batch programs for such things as report and file maintenance, as well as several subprograms for the nine command functions established for the outpatient program: Admit, Update, Make an Appointment, Cancel an Appointment, Cancel a Clinic Session, Inquiry, Medical Record Request, Attendance, and Schedule Change. All programs have been written in the Easycoder assembly language.

Total system planned

When Children's links its current computer to a second Honeywell 1200 to be installed later this year, it feels it will have the nucleus for a total information system integrating all of the hospital's medical, statistical, and financial data. The present computer will handle clinic scheduling and hospital bed control (Children's will retire its System 360 when the second Honeywell is installed); the new computer will process batch accounting, administrative, and statistical data.

Some of the reasons for the great hopes Children's Hospital places in its new computer system were phrased by the hospital director, Leonard W. Cronkhite, Jr., M. D., in a talk he gave when the new clinic scheduling system was publicly demonstrated in March of this year:

"We anticipate the clinic scheduling system will help have an effect upon reducing the total cost of care to patients by cutting down the number of clinic visits required per medical episode. Presently, many patients' parents are required to bring their children back to the

View from behind screen of cathode ray tube shows clerk entering data while nurse checks her out on procedure. Nurses gained experience on hospital's previous bed utilization program.

clinic for repeated visits. Each time they do, they not only pay a clinic fee but also have baby sitter costs, transportation expenses, in some cases loss of pay and the like. In a large number of cases multiple visits are required because a child's condition demands he be seen in several different clinics—for example children seen in the General Medical Clinic may also require visits to Orthopedic.

"Until now, because of the tremendous volume of appointments we handle, it has not been easily possible to coordinate these appointments so both can be kept on a single visit to the hospital. Instead the child and parent have had to come to the hospital at least twice. We can now cut this visit per epi-sode in half in most cases, with a resulting decrease in cost to the parent."

Obviously, the new system benefits patients and their parents, but what about the Medical Center itself? Will it run its costs up?

Case load smoothed

Again Dr. Cronkhite provides the answer:

"More effective utilization of staff time is being accomplished through the use of the computer. Prior to going on line, the doctor's patient load per day varied from heavy to light. The scheduling system now gives the individual doctor a more balanced case load, provides him advance knowledge of who his pa-tients will be on any given day and what their medical problems are, and, most important, allows him adequate blocks of time to handle the scheduled load. The same holds true with the ancillary personnel, such as the physical therapist, the X-ray technicians, and the like. There are two major spin-offs from this. We can set up a staffing pattern equal to the load instead of having to staff for maximum possible clinic attendance, which frequently is far in advance of the actual attendance. Secondly, we are convinced that we provide better patient care by eliminating the feeling of pressure a doctor gets when he knows there's a large number of patients still out in the waiting room waiting to see him."