

TEETH 'N MIIS

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The flexibility of MIIS is being utilized in a Dental School environment to meet educational, clinical, research, financial, and management needs. Test grading, electronic student grade book and test composition assist in meeting the educational demands. The clinical aspects of the system support procedure tracking, appointment scheduling, patient demographics, chart tracking, clinic points, and student evaluations. Research data bases and various statistical analyses are also supported by this MIIS system. On-line cashiers, A/R with general ledger and billing in addition to budget composition all assist in the financial aspect of the School. Dental records routines, A/R reports, student and patient reports, inventory tracking, and a fuzzy decision maker help meet managements needs. In addition, there are electronic mail, word processor, and other miscellaneous routines to round out this comprehensive Dental School package; all in MIIS.

In the Beginning

The School of Dentistry at Loma Lina University began computerization circa 1977 on a Data General Nova System using pre-B-Tree MIIS. There were three terminals, one of which was used for entry of student evaluation forms with the other two being used infrequently. The School remained in this time sharing mode with a maximum of twelve terminals, going through several revisions of MIIS (requiring significant re-writing), until July of 1982 when the decision was made to purchase a Data General Eclipse S/250 running Medi-Tech's Standard MIIS. The S/250 was received and the computer room made ready by October. The entire School came on-line with their new system on January 2nd, 1983.

Hardware

The School's system is capable of handling sixty four ports with forty eight active partitions (there are currently fifty one ports in use.) The S/250 has 512 kB of

main memory, two 6061 disk drives with approximately 192 MB per drive, and one 6026 (75 ips/800-1600 bpi) tape drive. The ancillary hardware includes Televideo 925, Hazeltine 15xx and Esprit VDT's, NEC 5520 and TI 820 printers, a Printronix P-300 (300 lpm) line printer, strip printers and TI 850s for receipts, and a Chatsworth Data card reader.

People

Most importantly, there are in excess of eighty caring and patient operators (users) that can access the School's system. These individuals vary from novice computer users to those who have used the system almost from its inception and/or are highly computer literate. It is those operators who make the system what it is and what it will be as it evolves.

To reiterate the power and versatility of MIIS, approximately ninety five percent of the applications and additional systems type software were written by one programmer with interference being run by an able secretary. The School's system currently still consists of only one full time Programmer/Analyst (becoming competent in MIIS very quickly) and the same Secretary/Computer Operator.

Software

"We'll have to pull it."

The clinical aspects of the School's needs were historically addressed first with a patient data base that currently consists of more than sixty thousand patient's demographic data, e.g., dental chart number, patient name, address, insurance information, and health summary. Also included is a patient name soundex system which enables retrieval of data if the patient chart number is unknown. The clinical/dental records sub-system also consists of chart tracking, i.e., when and to whom a chart is checked out to, as well as patient

assignment routines. Additionally, a recall system by department is operational with listings generated and recall letters being sent when appropriate.

Appointment scheduling and student block assignment are newly added capabilities and encompass the use of some 230 dental chairs. Appointment scheduling is also tied in with the patient visit (PV) form. During an appointment the patient visit form is completed, turned in by the student (after obtaining the appropriate signatures), and is entered into the computer by data enterers. The PV form includes information on the times of the appointment, with and by whom, the procedures started, in-progress, or completed. This form is the main vehicle which drives the student points and accounts receivable routines. The student needs to successfully complete a prescribed number of procedures (points) as well as proficiencies before graduating thus he/she is motivated to complete the form. Additionally, the form, when entered into the system, forms the basis for patient charges and thus the accounts receivable.

Finally, the School's clinical sub-system is used to summarize student evaluation forms where, in a dental practice simulation, Dental, Hygiene, and Dental Assistant students evaluate the performance, attitude, etc. of each other during the appointment. It is expected that in the future the various clinical functions will serve as the emphasis for continued computerization.

Didactic

The School uses the card reader previously mentioned as the means of entering the course exams. The School uses pre-perfed punch cards rather than mark sense. The tests are graded, test results given to the students and instructors, an on-line grade book kept (if the instructor wishes), and course standing, etc. given upon demand to the instructor and student. The word processor (written in MIIS) is used by some instructors to contain all the test questions for a course from which a suitable selection is drawn for a particular exam.

It is Hypothesized

The research and statistical components of the School's system are perhaps the weakest as policy dictates that the system should address the School's on-line primary needs first. Further, it is debatable whether the CPU should be tied up doing extensive analyses (especially since the advent of the micro) except at night (which could conflict with report generation), research data bases have a tendency to become large, and possible security problems support the contention that major research needs not be

meet with this system. Nevertheless, the system does support data bases from lab projects and patient demographics. Statistical routines available for the analysis of data include descriptive statistics, paired T-test, correlation, and analysis of variance.

Pass the Buck

The School's Data General is also the main repository for the patient's financial information. As mentioned previously the patient visit form is the main vehicle for charging patients for dental treatment. In this new schema, cashiers are placed through out the clinic to acquire patient payments and produce corresponding payment receipts. The accounts receivable system is capable of producing on-line financial information on a patient, delinquent accounts and other financial reports, audit trails, general ledger reporting, patient billing, and treatment planning. The Orthodontics financial system is also capable of tracking various payment plans for a patient. It is expected that a more comprehensive insurance sub-system will be added in the future as more patients avail themselves of dental insurance plans.

The School's budget is also manipulated and stored on the S/250. Budgeting includes keeping employee financial data, time worked (time card data), travel expenses by individual and cost center, and estimating revenues and expenses by cost center. The budgeting routines are not nearly as sophisticated as Visi-Calc like routines (maybe some day) but do allow a rudimentary form of 'what if' and have reportedly saved many hours of work.

Up the Organization

Many of Dental Records routines, accounts receivable reports and displays, and clinic student/patient reports help management in the running of the School. In addition to the above there has recently been added an inventory system for Dental Supply which includes student financial accounting. Fuzzy decision maker routines are also available on-line for use by management in making decisions where there is a lack of quantitative data.

Other

As previously noted a MIIS word processor (line oriented text editor) which is used by nearly all the secretaries is available and is capable of printing on any of the printers previously mentioned as well as on Canon AP400 typewriters that are attached to the secretaries Televideo. An electronic mail routine is used by all operators for sending messages to one another or keeping on-line notes for their own information.

Sub-systems to meet special needs have also been written for the Orthodontics, Graduate Endodontics, Restorative, Continuing Education, and Dental Auxillary Departments.

Some of the system type software that have been written include security routines to limit users to specific VDT's, sign-on times, and programs, and enable unique ciphers for each operator. Additionally available are a 'universal' device handler (thus the mix of Televideos, Hazeltines, and printers without problems), program use tracker, date routines, device set-up and display which is also associated with the %SS routine, date and time header for printouts, an error handling routine and global, variable timed-read routine with time out and message display, and a zip code program with a zip code directory.

Recommendations and Conclusions

The following recommendations are based on hindsight and even on what has gone right in the development of this Dental School's System:

1. Buy all major equipment from one vendor, including the CPU, memory, communication boards, disk drives, and tape drive. Data General is recommended as hardware of choice almost without reservation as well as MIIS for the operating system. In the first year with the S/250 we had a total unscheduled down time of one and a half hours. MIIS has operated flawlessly since installation. Even with some thirty individuals using the text editor, accessing patient data, doing appointment scheduling, etc. the system still operates fast enough that the word processor girls seldom complain about response time.
2. Buy a far bigger machine and memory than you think you will need. There is always someone wanting their own VDT, routines, and files.
3. Buy or develop a fast data base handler and impliment it from the beginning. Keep its overhead to a minimum.
4. Buy or develop a good security system, use it and defend it vigorously. There is enough to worry about without asking for problems with system security.
5. Get together a good set of dedicated people and the results make the long hours worth it.

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