A PC-Based Free Text Retrieval System for Health Care Providers

Design and Development*

James K. Massey, Ralph R. Grams, and Ming Jin

The purpose of this paper is to describe the design and development of the Clinical Practice Library of Medicine (CPLM). CPLM is an investigational project aimed at providing health care practitioners with critical in-depth information similar to that obtained from a medical reference library or consultant. When used in conjunction with the physician’s knowledge, CPLM can provide valuable diagnostic prompting information to assist in rapidly reaching a suitable diagnosis for timely administration of appropriate treatment. This system may also be used to assist paramedical professionals working in remote areas where other expert medical assistance may not be available.

INTRODUCTION

There are many situations where immediate access to expert medical information can be of critical importance in selecting appropriate treatment. For the practicing physician, this access usually comes in the form of personal recall, retrieval from some written reference source, or by sending the patient to a consultant. CPLM attempts, through the use of user-friendly on-line access to expert medical reference material, to overcome many of the limitations inherent in all three of these approaches.

Wherever access to written reference material or a needed medical consultant is not conveniently available or cannot be obtained in a reasonable amount of time, CPLM can be used. This is particularly true in isolated or remote areas. By providing the trained user with access to an on-line reference source such as CPLM, a pseudodialogue can be gen-

* Support for this work has been provided by NASA under grants SIPRO-I1, NAG10-007, NAG10-0012, NAG10-0020, and NAG10-0028. This paper was presented at the 20th Hawaii International Conference on System Sciences, Honolulu, Hawaii, January 1987, and is republished here with permission.
erated to provide much of the information that would normally be available from a con-
sultant or a library of reference material.

BACKGROUND

In 1972 a detailed design was published postulating the development of an on-line biomedical library.¹ These ideas, contained in a grand design for a computer-supported World Library of Medicine, were viewed at the time with considerable skepticism. Over the years, additional effort put forth on an internal basis at the University of Florida began to coalesce these ideas toward a workable system.²⁻⁴ The result of these efforts has been the development of the Clinical Practice Library of Medicine (CPLM). The initial demonstrations were structured around a standard protocol applicable to clinical pathology as implemented on a large mainframe computer system. The first successful mainframe prototype was a frame-processing system written in PL/1 by Dr. William Ingram. The first generalized prototype directly associated with the current project was coded in the INQUIRE database proximity language of INFODATA Inc.⁵ Expansion of this knowledge base to include commercially published reference material was begun under a series of grants from the National Aeronautics and Space Administration (NASA)† in 1979.⁶⁻⁹

Early development efforts begun on large IBM mainframe computers have migrated toward present implementations on personal computers. These developments have included new approaches to the whole concept of text database management and have resulted in an improved system that takes advantage of the speed, cost, and availability of current generation IBM‡ compatible personal computers (PCs). Feedback from many participants and evaluators concerning CPLM indicate that the present version of the system is indeed beginning to surpass early estimates of its usefulness.

CPLM in its current form actually consists of two major areas that are mutually supportive of the systemic goal. The first of these is the CPLM DATABASE MANAGER, which controls the access to the free text database. The second is the data itself, which has been compiled specifically to support the critical mission of providing rapid access to expert medical knowledge to a large base of anticipated health care users. The database currently contains a moderately large quantity of information on human disease and disorders. In its maximally expanded form, the CPLM database will include access to a large and comprehensive base of medical knowledge. The CPLM DATABASE MANAGER contains facilities to enable this base of knowledge to be rapidly searched to determine all available information via simple keyword searches (synonyms, etc.). In this context, the user can be more concerned with the content of the database than with the location of needed information (as in a conventional library). The bulk of the remaining portions of this paper concern the CPLM DATABASE MANAGEMENT system as opposed to the contents of the database itself.

---

¹ This early mainframe computing was done at the Northeast Regional Data Center of the State University System of Florida located at Gainesville, Florida.
‡ IBM is a registered trademark of International Business Machines Inc.
† Current efforts are supported in part by NASA grant NAG10-0028.