An Expert System for Determining Medicaid Eligibility

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The eligibility requirements for AFDC Medicaid are so extensive and complicated that most health care providers do not attempt to ascertain whether or not a particular patient is eligible for the program, even when no other source of payment is available. This results in lost revenue for health service providers nationwide amounting to hundreds of millions of dollars per year. Computer technology, in the form of expert systems, offers an opportunity to rationalize the Medicaid eligibility determination process and to do real-time assessments of patient eligibility. This article presents an expert system called MEDELEX (MEdicaid ELigibility EXPert) for determining Medicaid eligibility. The program (when run on an 8 MHz MS-DOS microcomputer with at least 640 KB of RAM) requires about 20 min for data entry and 5 sec for the actual eligibility determination. The expert system was written in Prolog and has been designed in such a way that it can be readily modified to take into account the state-to-state variability in eligibility requirements for AFDC Medicaid.

INTRODUCTION

Health services providers who accept Medicaid reimbursement are sometimes faced with the necessity of making rapid decisions about a patient’s eligibility for Medicaid benefits before providing services, but the complexity of the task does not lend itself to doing this. Complete collection of data about earned income, unearned income, assets and expenses for the household unit, and the systematic comparison of these data to eligibility criteria is a time-consuming and error-prone process.

It has been estimated for the state of Wisconsin in a recent 13-month period that “deficient information” costs to providers of Medicaid services (296 hospitals and 13,286 “others”) were $72.5 million. When these data were extrapolated to the United States as a whole (excluding Arizona which did not begin full participation in the Medicaid program until 1986), the nationwide costs to Medicaid providers were estimated to be $3 billion annually. This report did not differentiate between “deficient information” in which eligibility was questioned and “deficient information” on billing forms (or that which could be associated with the billing process). In another study, bad debt and charity

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expenses for hospitals across the United States were estimated to be $5.7 billion in 1984. This represented 4.6% of hospital costs in that year, up from 3.6% of hospital costs in 1980. Undoubtedly, some of these costs may be attributed to losses from Medicaid-related services, which are already among those with the lowest hospital and physician reimbursement rates.

In many states today gathering the data for a Medicaid eligibility determination (including family sociodemographic characteristics, participation status in various job training programs, household labor force participation, liquid assets of all household members, nonliquid assets, earned income, unearned income, expenses of the household unit, etc.) have become so complicated and time consuming that it appears to have become a serious impediment to participation in the Medicaid program. The state-to-state variability in eligibility requirements has been documented by Newacheck and Halfon, and has been described as a “labyrinth” by Friedman. Undoubtedly, these differences have served as an impediment to rationalization of the methods for eligibility determination, because they make the solution to the determination of eligibility idiosyncratic to the political jurisdiction in which the determination is made. Thus, the current eligibility determination process contributes to revenue losses in health services organizations and may also be deterring eligible patients from receiving needed health services. One observer has concluded that the structural inadequacies of Medicaid are so great that the program should be dismantled. Unless radical changes occur the Medicaid program will continue to operate as it has in the past and the determination of eligibility will continue to be a cumbersome technical problem. The application of artificial intelligence technology to this thorny issue offers the potential for at least reducing this source of frustration for providers and patients. The present research is intended to contribute to a solution to this problem.

METHODS

The present paper presents an expert system for the determination of Medicaid eligibility, which runs on a PC-DOS (MS-DOS) microcomputer. The program (named MEDELEX for MEdicaid ELigibility EXPert) accepts data entered through formatted CRT screens for an individual patient and then applies structured decision rules to make an eligibility determination for the patient. The concepts of expert systems and artificial intelligence have been well documented, in general, and for medical applications, in particular. An expert system is a computer program which depends upon a specialized body of knowledge to perform complex tasks which are usually performed by human experts (thus displaying “artificial intelligence”). MEDELEX is a rule-based system which consists of a knowledge base (the rules and facts), data (supplied for each case through the formatted screens), and an inference engine which applies the rules and facts stored in the program to the data concerning each case. Unlike most expert systems in this field which have been developed to perform diagnostic or treatment functions, this one is concerned with a management (administrative) problem in the medical care field.

As a series of the questions about eligibility factors of the household unit appear on a CRT screen, the intake worker (clerk) asks them of the patient. These questions are based upon the topic areas presented in Table 1. At the completion of the data acquisition