

Programming a Predictive Formula for Angina and Other Risk Factors in Patients with Cardiac Diseases Undergoing Noncardiac Operations

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We programmed a formula which predicts the incidence of either myocardial infarction or cardiac death during the postoperative period. The original formula was proposed by Shah et al, based on their own data and analysis. The program is simple and is written in a language called Quick Basic. The use of this program is also simple. Such a program has improved the use of this analysis substantially. The program has been posted on to a few Computer network services as a free software. (Key words: cardiac risk, computer program, perioperative)

(Suwa K, Ogura S: Programming a predictive formula for angina and other risk factors in patients with cardiac diseases undergoing non-cardiac operations. *J Anesth* 6:241-242, 1992)

We programmed on to a personal computer a formula which predicts the incidence of either myocardial infarction or cardiac death in patients with cardiac diseases undergoing noncardiac operations during the postoperative period. The formula was proposed by Shah et al¹, based on their own data and analysis. While useful, this formula is extremely complex and virtually impossible to use manually. We therefore chose to program this on a personal computer.

The structure of the program is relatively simple. It first reads the various variables. It then jumps to an input section and request the user to enter the information about the patient. It then calculates the probability of either MI or cardiac death to occur,

and shows that value. Finally, it exhibits the reference from which the data and analysis of this program is derived. The size of the program is small, requiring only 3 kilobytes of memory for its source text. Actual execute file occupies about 40 kilobytes of memory. It is written in a language called Quick Basic and relatively easy to translate into other machines or other languages.

The use of this program is also simple. It is arranged in such a way that the user responds to eight questions, which should be answered by "Yes" or "No". These eight questions are those presented in the original study, namely, emergency operations, presence of angina, previous myocardial infarction, EKG ischemic changes, age over 70, nature of surgery (thoracic/abdominal and/or major vascular), and low serum potassium. Then the program exhibits the probability so calculated.

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We found that this program is useful for daily evaluation of patients who are old or who are with ischemic heart disease. Although it may be argued that the analysis is applicable only in that particular institution where the study is performed, at least the data are open and the analysis is objective. It is sometimes useful even for a basis of discussion weighing the risk of immediate surgery or waiting/treating it. Formerly such discussion tended to remain subjective with no support of scientific data.

The virtue of this original analysis by Shah et al is that, while their analysis is relatively complex and their mathematical presentation is not intuitively clear to everybody, the entry items are simple and easy to answer and the formula is easy to program on a small computer.

This analysis, however, would rarely, if ever, have been used for our daily management of patients unless it is programmed on a computer. Thus we believe it is particularly important that the data and its analysis be presented in such a way that they may be easily programmable on a computer.

We have one request to make to the authors of this paper. We hope they try to analyze their own original data in such a way that some of the questions may be answered numerically rather than by a simple yes or no. Difference between age 69 and 71 can never be so large for an individual patient as this analysis indicates. A

similar argument can be made against the use of K^+ value of 3.5. A further analysis may turn out to be of little value. Until proven that way, however, that suspicion remains and makes us feel somewhat hesitant to use this analysis as presented. Such analysis is possible only by those who have done the original study.

We will not post the program list here. For one, anybody with some knowledge of programming language can do it. Also, for those who would not dare to bother to program it themselves, our own program has been posted on to a few Computer network services as a free software including "Ether-Net", which is a Special Interest Group (Anesthesiology) net in a popular Japanese medical computer system, called AMS-PCnet. Both the original source text and the execute file are available².

This work was presented at the 38th Congress of the Japan Society of Anesthesiology. The program is available from that network mentioned in the text.

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