Infection Control Software

To the Editor:

NOSO-3 (Epi-Systematics, Inc., Ft. Myers, Florida) has been successfully used for tabulating and reporting nosocomial infections for the past five years. During that period, the product has been widely respected by the over 350 people who use the software most-infection control practitioners (ICPs). While universal acceptance of NOSO-3 is desired, the realities of personal preference must be accepted. Because one software package may have distinct advantages over another, the user should define the environment in which the product will be used and the needs to be accomplished before a purchase is made.

Published product comparisons and reviews can be helpful to the prospective buyer by offering time-saving shopper information. It is the responsibility of the author and publisher to ensure that readers are not misled by the information presented in these articles. Comparison of data handling and performance characteristics should be scientifically evaluated and presented in a nonbiased fashion. Such was not the case in the April issue.[1]

While the time necessary for report generation may be longer with NOSO-3 than with AICE (ICPA, Inc., Austin, Texas), the time reported by LaHaise is incorrect. Repeated use of NOSO-3 in our offices, as well as by other users, supports this statement. The reviewer's focus was directed at the versatility and flexibility of each of the products. While this factor is important and deserves attention, the trade-off for increased speed is loss of flexibility and power. We agree, AICE is less complex than NOSO-3. A rigid data base structure limits the number of variables, types of analyses or time periods to be analyzed.[2]

Buyer beware, the quick solution may, in the long run, be false economy. Dissatisfaction with other software packages has prompted several ICPs to alter the software they use to NOSO-3. These ICPs found that they did not have enough fields for data entry, were limited by the number of pathogens that could be entered for each infection or were too confined by the limited report generation capabilities. For some however, the limitations of infection control packages other than NOSO-3 still may be more power than they require for the information they manage.

Unfortunately, in her focus on operation speed, the author failed to correctly evaluate NOSO-3. Efficiency was repeatedly mentioned during the comparison of the packages. If efficiency is loosely defined as the ratio of data content per bytes of computer storage used, NOSO-3 is superior. AICE stores Yes/No values as a single byte (8 bits), while NOSO-3 stores the same data in a single bit. In these terms, NOSO-3 is 87.5% more efficient than AICE. Flexibility and ease of use were also adjectives used during the comparison evaluation. The author extrapolates data base size and concludes that NOSO-3 has an effectively smaller capacity than AICE. What she fails to mention is that the latter product cannot store data for longer than 12 months. NOSO-3 allows the user complete flexibility in moving from window to data entry window. It also allows the user to move freely from field to field while entering data. AICE only allows the user to go forward; if the user tabs back through the data, entries made earlier are erased.

The author states that defining a line listing is more difficult in the NOSO-3 framework. Field numbers needed for this definition are found in the appendix and are clearly labeled. The reason field numbers are used is so that the user can redefine fields for his or her own purpose. This is one of the most powerful features of the total flexibility associated with NOSO-3. LaHaise implies that NOSO-3 was modeled after dBASE (Ashton-Tate, Torrance, California). This is not correct. There are three general types of data-base structures. This first is the relational model. In this mode, entries are kept in rows of a table, much like a hotel register. dBASE is a relational data base, as is AICE. The second type of data base is the hierarchical model. In this model, data are stored in a manner that reflects an organization chart, with each entry having multiple descendants. NOSO-3 is based on the hierarchical mode, not the relational model, as implied. The third model is the network model; neither product uses this structure.

LaHaise states that the inaccuracies in calculation are the results of a data-base design flaw. However, she states that when a patient is readmitted, the previous data are lost. This statement indicates that the author did not use NOSO-3 properly. Each admission should be entered as a new demographic record. This information is stated in the users' manual. Also, fields for service, etc., are available in the body site (infection) record so that the appropriate service can be credited with the infection. If the author changed data for readmitted patients, of course the computed rates will be incorrect. As far as NOSO-3 is concerned, the patient was only admitted once. AICE requires the user to enter a new record for each infection; NOSO-3 allows the user to add multiple infections per admission. The

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statement made by LaHaise that the readmission causes a loss of data such as service, admission date, etc., indicates the author's lack of understanding of the underlying data-base structure of NOSO-3. In addition, that "no analyses of such important factors. . . can be trusted to be accurate in analyses with NOSO-3" is incorrect.

NOSO-3 3 possesses the ability to help ICPs meet the new Joint Commission on Accreditation of Healthcare Organizations (JCAHO) standards. Focused infection studies, patient outcome information, rates stratified by infection risk and physician-specific rates are integral functions performed with the power of NOSO-3. The choice of which program best satisfies the needs of the hospital infection control program rests with the user.

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REFERENCES

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2. Reagan DR. The choice of microcomputer software for infection control. *Infect Control Hosp Epidemiol.* 1990;11:178-179.

Sharon LaHaise, RN, PhD, was asked to respond to this letter.

The representatives of Epi-Systematics, Inc. (Ft. Myers, Florida), distributors of NOSO-3, raised seven issues in response to our study comparing software for meeting the new standards required by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO). First, they stated, without citing specific flaws in the design, that our comparison was not done scientifically. Following a specific protocol, we used a large clinical data base of the type needed for JCAHO reports, loaded an identical version of it into both software systems according to the companies' written instructions, consulted the companies frequently, performed the identical analyses repeatedly in both, measured the processing times with an accurate stopwatch and compared the results to an acknowledged statistical software package (SAS, SAS Institute, Inc., Cary, North Carolina) to assess accuracy. The scientific merits of the study stand on their own.

Second, they allege that the timings were incorrect, citing the experience of their own staff and unnamed "users" without numerical data. Without executing the same analyses on the same data base, it would be impossible to make valid comparisons. The only way the speed of NOSO-3 could have compared more favorably is if they were using small data sets used in the past for line listings, but these will not be sufficient to satisfy the new JCAHO standards.

Third, they suggest that there must be a trade-off between speed and analytic power and flexibility. While possibly true for collecting large numbers of variables on infections as we did in the past, it is not true for the types of focused analyses that will be needed for meeting the new JCAHO requirements. For performing epidemiologic analysis of surgeon-specific rates and the like, AICE (ICPA, Inc., Austin, Texas) was both faster and more efficient and flexible.

Fourth, they claimed that NOSO-3 was more efficient, based on their own "loose" definition of "efficiency" as "the ratio of data content per bytes of computer storage." This definition begs the question. Infection control practitioners (ICPs) are unlikely to care about computer science definitions; they want to be able to perform the JCAHO-mandated analyses with the least expenditure of time in data input and analysis, and with complete accuracy.

Fourth, regarding the underlying design models of AICE and NOS-3, they were correct in identifying AICE as a relational data base and NOSO-3 as a hierarchical one, but this distinction misses the point made in our article. We found that NOSO-3 resembled dBASE (Ashton-Tate, Torrance, California), not in its data structure, but in its analytic strategy. NOSO-3, like dBASE, analyzes data by counting one field at a time, storing the counts and then combining them into a rate, all in separate, time-consuming steps. AICE, like SAS and other statistical software, does the entire calculation in one step. This difference accounts for AICE's greater speed of calculating. Besides making NOSO-3 slower, the hierarchical structure also accounts for the computational errors found.

Sixth, they charged that we used their product incorrectly by setting it up with one demographic record per patient. They suggested instead that we should have entered one demographic record per admission. And yet, page A-l of the description of the data base in the NOSO-3 user's manual clearly states, "Only one demographic record is stored per patient." Even if we had violated the manual's instructions, as they suggest, computational errors would still have occurred in almost all analyses because of apparent malfunctions in NOSO-3's mechanism for linking the hierarchical files and on surgical analyses whenever a patient has operations on more than one service, etc., as noted in the article.

Seventh, the speed of operation and data manipulation was a focus of the article because time/cost analysis (the cost associated with personnel hours to accomplish a task) is of primary concern to the effective management and operation of a department. If each analysis is so time consuming or complex, further analytical investigations are discouraged, and productive time is compromised.

All of the claims of superiority by Epi-Systematics, Inc., regarding their product appear to be subjective. As for AICE, data can

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