29.5 months in the remaining 33 patients, who received hearts from non-B donors) the group was too small for this fivefold difference in survival to reach statistical significance.

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FREQUENCY OF CHANGING TUBING ON MECHANICAL VENTILATORS

To the Editor: Craven et al. suggest that mechanical ventilator tubing need be changed only every 48 hours, rather than every 24 hours, as is common practice (June 24 issue).[1] We applaud them for conducting this randomized study, which could potentially contribute to substantial savings in hospital costs. However, we believe that the data analysis leaves their conclusion open to question.

In the first place, they assume, without presenting supporting data, that multiple cultures from the same patient can be treated as independent observations. This assumption requires considerable justification, since we would expect individual patient characteristics — for example, underlying disease and pulmonary status, presence of purulence in the tracheobronchial tree, and antimicrobial therapy — to influence the probability of contamination of the tubing. This does not mean that multiple cultures from the same patient may not yield useful data, but that correlations in the data should be taken into account. The analysis presented makes the number of independent observations, and thus the power of the study to detect differences of interest, appear larger than is actually the case.

Furthermore, the authors accept the null hypothesis of no difference between the two groups on the basis of a nonsignificant observed difference and enough power to detect differences of interest. However, since the study was designed to show that changing the tubing every 48 hours is as effective as changing it every 24 hours, the relevant hypothesis to test is that changing every 24 hours is actually more effective by at least some specified amount δ, chosen so that rejection of the hypothesis is equivalent in practical terms to a conclusion that changing tubing every 48 hours is sufficient.[2] A one-sided confidence interval would be helpful in interpreting the results; if δ is not included in the interval, then the hypothesis can be rejected at the indicated level of significance. The authors do present a "likelihood," by which perhaps they mean a confidence limit, but whether this is the case is unclear.

Nevertheless, the number of patients in the study may be sufficient, or nearly so, to support the authors' conclusion. For example, the reported proportions of cultures with no growth, P_{24} and P_{48}, are 0.70 and 0.68, respectively. If only the first culture from each patient were used and the proportions with no growth were about the same as mentioned above, then the upper 95 per cent confidence limit for the difference between P_{24} and P_{48} would be about 0.2 — that is, any hypothesized difference greater than 0.2 could be rejected at the 5 per cent significance level. If such a result did not warrant a conclusion that every 48 hours was often enough to change ventilator tubing, then more patients could be studied.

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1. Craven DE, Connolly MG Jr, Lichtenberg DA, Primeau PJ, McCabe WR. Contamination of mechanical ventilators with tubing changes every 24 or 48 hours. N Engl J Med. 1982; 306:1505-9.
2. Blackwelder WC. "Providing the null hypothesis" in clinical trials. Control Clin Trials. (in press).

To the Editor: In reviewing the findings reported by Craven et al., we found several points that we believe deserve clarification.

Was the investigator who collected and processed sputum and gas samples from the ventilator circuit aware of the circuit-change schedule — i.e., was the observer "blinded"?

Were patients in the 24-hour group (Group 1) treated in the same way as those in the 48-hour group (Group 2)? Several of the reported findings suggest that both groups may not have been treated similarly. For example, a "complete microbiologic examination" was performed more often on specimens from Group 1 patients (4.0 cultures per patient) than on those from Group 2 patients (2.6 cultures per patient). Furthermore, the results suggest that patients in Group 1 may have received mechanical ventilation for longer periods than those in Group 2. Differences in treatment need to be explored as possible sources of bias in the comparison of the two groups.

How were patients selected for "complete microbiologic examination" and for studies on tubing colonization levels? Specimens were apparently obtained from only 23 of the 44 Group 1 patients and from only 31 of the 51 Group 2 patients. Similarly, only 15 patients from each group were included in studies of levels of tubing colonization. A potential for bias exists in interpreting the results if patients were not randomly selected.

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The above letters were referred to the authors of the article in question, who offer the following reply:

To the Editor: Drs. Blackwelder and Henderson question whether multiple cultures from the same patient can be considered independent observations. Since we initially shared this concern, we designed our study so that the number of cultures from each patient was limited to a maximum of five. In examining our data we did not find any correlation between the culture results for individual patients. This was formally checked by means of a "goodness-of-fit" test. No difference was detected between the number of patients observed to have multiple positive cultures and the number expected to have multiple positive cultures under the assumption that each culture was an independent observation (chi-square (12) = 13.4; P = 0.3).

The second point raised by Blackwelder and Henderson is valid but minor. In essence, they are rewording our power calculations at some specific δ. Traditionally, analyses focus on a null hypothesis of no difference, supported by power statements. Finally, the choice between a P value and a confidence interval applies to many testing situations. Our statement that "the likelihood of a true difference of 0.10 in contamination . . . between the 24-hour and the 48-hour group is less than 0.03" easily translates into "the upper 97 per cent confidence limit for the difference between P_{24} and P_{48} is 0.10."

In reference to the three questions raised by Drs. Boyce and Walsh, the research assistant who collected the samples was not "blinded" and the patients in both groups were randomly selected and given the same treatment. Complete microbiologic examination was performed on specimens from both groups of patients over a specified interval, and 15 patients from each group were consecutively selected for the colonization studies.

In summary, we feel justified in our analysis of multiple cultures from the same patient, and we emphasize that our data supporting 48-hour tubing changes in ventilators with cascade humidifiers confirm the earlier in vitro observations of Reinarz and his colleagues.*

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*Reinarz JA, Pierce AK, Mays BB, Sanford JP. The potential role of inhalation therapy equipment in nosocomial pulmonary infection. J Clin Invest. 1965; 44:831-9.

CARPET-LAYER'S KNEE

To the Editor: A workman installing wall-to-wall carpeting in one of our homes, and another doing the same work in our office, de-

scribed bilateral pain and unilateral effusion of the knee, which required multiple arthrocenteses. We noted that such workers strike a "knee kicker," used to stretch the carpet, with the suprapatellar area of their knees. Subsequently, the steward of a carpet-layers union reported that members had required knee surgery, evacuation of knee effusions, and treatment of repeated joint infection. These entities appear to resemble beat knee[1] or housemaid's knee,[2] reported previously among workers who kneel. Recently, Swedish investigators reported that the symptoms and morbidity from knee disorders were proportional to the amount of kneeling required by trades.[3] We hypothesized that these episodes in carpet layers may result, in addition, from repeated chronic knee trauma associated with use of the knee kicker.

We found further evidence of knee problems among carpet layers in data from the Bureau of Labor Statistics' Supplementary Data System.[4] We searched the data for 1979 from 31 states that participated in the system, for claims for knee injuries classified as inflammation or irritation of the joints brought about by leaning, kneeling, repetition of pressure, or striking against a stationary object. A total of 742 such claims were reported in 1979. There were 21 occupations that contributed 10 or more of the total claims. Table 1 lists the

Table 1. Worker's Compensation Claims for Knee-Joint Inflammation Attributed to Kneeling, Leaning, Repetition of Pressure, or Striking against a Stationary Object.*

Occupation	No. of Claims	Per Cent of Claims	Per Cent of Work Force	Occupational Knee-Morbidity Ratio †
Carpet installers	46	6.199	0.0575	107.81
Tile setters	16	2.156	0.0410	52.59
Floor layers	10	1.348	0.0291	46.32
Dry-wall installers and lathers	10	1.348	0.0605	22.28
Cement and concrete finishers	10	1.348	0.0814	16.56
Miscellaneous laborers	23	3.100	0.2634	11.77
Miscellaneous mechanics and repairmen	20	2.695	0.2298	11.73
Carpenters	66	8.895	1.0896	8.16
Sheet-metal workers and tinsmiths	11	1.482	0.2017	7.35

*From the Supplementary Data System of the Bureau of Labor Statistics, 1979.

†Per cent of claims/per cent of work force.

occupations in which the crude ratio of knee morbidity was greater than 5. The numerator for this ratio is the percentage of the total 742 workers' compensation claims contributed by the particular occupation (second column of values). The denominator in this ratio is the percentage of all employed persons over 14 years of age in the 31 states who had the particular occupation as their principal one, according to the 1970 census (third column of values). In the first three trades — all requiring kneeling — the knee-morbidity ratio is much higher than in the occupations that do not require as much kneeling. Furthermore, the proportion of awards to carpet layers for knee disability is out of proportion to their representation in the work force.

We are now conducting a clinical-epidemiologic study of knee disease among carpet layers. Our goals are to define the nature and scope of the knee disorders in this occupational group and to identify causative factors that may be controlled through changes in work practices or redesign of tools. Although the above observations are preliminary, we thought they would be of interest.

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1. Roantree WB. A review of 120 cases of beat conditions of the knee. Br J Ind Med. 1957; 14:253-7.
2. Hunter D. The diseases of occupations. 6th ed. London: Hodder & Stroughton, 1978:780.
3. Ekstrom M, et al. The kneeling working posture — aspects on occurrence of symptoms, pressure patterns and knee protection materials. Oreboro, Sweden: Bygghalsan Bulletin, 1981.
4. Root N, McCaffrey D. Producing more information on work injury and illness. Mon Labor Rev. 1978; 101:16-21.

THE HEALTH-SCIENCES INFORMATION STRUGGLE

To the Editor: Dr. Nicholas E. Davies has written (July 15 issue)* of the "health-sciences information struggle" between the National Library of Medicine and the developing private information industry and has outlined important reasons that health-science information must remain in the public domain.

Let me cite another reason. Medicine's spectacular progress is in large measure due to free information policies. The free exchange of scientific information has been, and should continue to be, the mark of ethical medical and scientific professionalism. In the past we have characterized secret cures as the mark of unethical cultists. Health secrets stored in computers for sale selectively to subscribers raise, if not the specter of cultism, at least an ethical concern.

Private information services should be encouraged to compete in the marketplace by attractively packaging and disseminating information in whatever ways users choose to purchase it. However, private services must not attain the position of being able to bar access to medical information any more than an ethical medical profession may deny access to care. Furthermore, they must compete without being allowed, through special protective legislation, to destroy the national treasure that is the National Library of Medicine.

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*Davies NE. The health-sciences information struggle: the private information industry versus the National Library of Medicine. N Engl J Med. 1982; 307:201-4.

THE INCREASING COSTS OF A "CORE" MEDICAL LIBRARY

To the Editor: Because medical librarians in New York State are planning a new program of state aid to rural hospitals for the purpose of improving library services, the actual current cost of a "core" collection seemed a necessary piece of information to have. Using the July 21, 1982, Rittenhouse Inventory, *Books in Print 1981-82*, and the information about the prices paid for journals by this library for 1982, we have updated the information given earlier by Stearns and Ratcliff.* Book prices were found for first-choice recommendations only, unless the first choice was unavailable for purchase; then, a subsequent choice was substituted. Although many papers and talks have contained statements regarding "higher costs and shrinking budgets," the resulting comparison of 1969 prices to 1982 ones was still quite a shock. The prices of these core items just about doubled every six years. In addition, the cost of the journal subscriptions increased 16.1 per cent from 1981 to 1982. Table 1 shows the com-

Table 1. Prices of Books, Journals, and Reference Material in 1969 and 1982.

Items	1969	1982	Increase	Yearly Average Increase
	$	$	%	%
Books	1,238.00	3,620.95	192	14.8
Journals	603.00	1,914.00	217	16.7
Reference material	174.50	657.95	277	21.3
Totals	*2,015.50*	*6,192.90*	*207*	*15.9*