These variations are not limited to meningococcal infection, since *Hemophilus influenzae* infections have similar variations. As noted in table 2, two deaths occurred among 96 patients treated in 1962, while nine deaths occurred among the 91 cases admitted during 1963. These differences are substantial ($X^2=5.30$; $p<.02$).

The contrast between these two types of infection during these four years is even more interesting, since the difference in meningococcal case fatality rates occurred in years characterized by a relatively stable (8.3 and 6.9) case fatality ratios for *H. influenzae* infections. The converse was also true, since 1962 and 1963 were characterized by stable (8.6 and 8.2) ratios for meningococcal disease. This independent variation of case fatality rates by etiologic agent provides assurance that alteration in the mechanics of the service were not important in the variation seen, but that the difference was due to other factors. These fluctuations are unlike the consistently low case fatality rates reported during World War II when Group A meningococcal disease was epidemic(3).

TABLE 2.—"HEMOPHILUS INFLUENZAE" MENINGITIS CASE FATALITY RATIOS, BY YEAR, LOS ANGELES COUNTY HOSPITAL

Year of treatment	Outcome of patient		Total cases	Case fatality (percent)
	Survived	Died		
1961	89	8	97	8.2
1962	94	2	96	[2] 2.1
1963	82	9	91	[2] 9.8
1964	110	10	120	8.3
1965	94	7	101	6.9
1966 [1]	68	5	73	6.8
Total	537	41	578	(7)

[1] Through October 1966.
[2] →X2=5.30; p<.02.

Whether these variations in the proportion of fatal cases reflect concomitant infections with other agents intermittently operative in the community, or whether they simply represent the extremes of chance variation is impossible to determine at this time. However, these variations do serve as a warning to those evaluating various forms of therapy unless observations are carefully controlled and made simultaneously.

Evaluation of the outcome of pneumococcal infections of the central nervous system is particularly difficult, since several recognizable factors are operative. The relatively low mortality seen with subsequent attacks in patients with repeated episodes of disease has been recognized for many years, as has the better prognosis with pneumococcal meningitis following otitis media or skull fracture, and the extremely high risk of the alcoholic and the elderly person. Particular hospitals, by virtue of serving skid-row populations may have case fatality ratios several times higher than those catering to younger or less debilitated populations.

Some of the problems in analysis of pneumococcal meningitis data are illustrated in Table 3. Here, one sees not only the variation by age, but also by severity of illness at the time of admission to the hospital. If one treated only younger patients, or excluded the severe cases requiring artificial respiration to maintain life during transfer to the definitive hospital and those with a fulminant course of a few hours duration, one would have quite a different case fatality ratio.

It is apparent from these data that if any rational comparison between hospitals or between treatment routines is contemplated, many factors must be carefully controlled. Analysis of the severity of illness at the time of admission to the hospital is essential, as is a strict random alternation of patients for various treatment routines. In addition, care must be taken in interpretation of results to avoid bias in regard to portal of entry, age of the patient, and the general state of health.

EVALUATION OF THERAPEUTIC REGIMENS

In an attempt to clarify the relative effectiveness of various currently advocated treatment routines, the activity of several antibiotics was determined against *Hemophilus influenzae*, Type B., *Neisseria meningitidis*, and *Diplococcus pneumoniae* isolated from spinal fluid. It became apparent that ampicillin, on the basis