the decreases in neonatal mortality and increased access to the available technology. All the hospitals experienced a decrease in neonatal mortality, but the decrease is more dramatic for those with the presumably increased access through the IMDC. This approach bypasses the questions raised by both the reports based solely on the mortality experience of tertiary centers where the factors affecting the selection of the patient population remain imperfectly defined, and those based solely on hospital of birth without any notion of the range of services provided directly or indirectly through closer referral ties to more specialized medical centers.

As in any report involving "volunteers," caution must be used in generalizing the results. In this case, the characteristics and motives of the hospitals which "volunteered" to use the IMDC, and the circumstances in which the IMDC appeared to be most useful—some of which the investigators mention—would be of importance, particularly in view of the higher previous mortality experience among the participating hospitals. The results are consistent with other data which suggest that access to intensive neonatal services has been instrumental in reducing mortality among high-risk infants. This evidence has come from studies on the decrease in birthweight-specific mortality,[1-2] hospital-based data in California,[9] at least one randomized trial,[10] and the mortality data in specific regions or hospitals with the introduction of intensive care services.[11, 12]

What this study by Vogt, *et al*, documents is that such decreases in mortality through access to intensive care units may be achieved without the care unit necessarily being located in the hospital of birth. The mortality experience of transferred infants was less than that of comparable infants not transferred, i.e., the outcome of low birthweight infants with hyaline membrane disease, (similar to that shown in other studies),[12] in addition, the improvement is reflected in the overall mortality rate of the referring hospital. The demonstration that community hospitals may benefit from formal referral ties between their hospitals and tertiary centers supports the centralization of tertiary services, one part of the regionalization model, and counters the tendency to proliferate costly intensive-care units in order to achieve the benefits of access to such care.

Until the birth of a premature infant or an infant with life-threatening anomalies can be prevented, all neonates must have access to intensive care services. The present study indicates that one way to secure this access is by increasing the efficiency of neonatal transport. Experience elsewhere suggests that additional benefits may be obtained by extending such a referral to include maternal transport for those situations where the birth of a high-risk infant may be anticipated.[13] Results of both approaches lend support to the regionalization of care for high-risk pregnancies and neonates as a means of reducing early mortality among infants.

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Breast Self-Examination: An Adjuvant to Early Cancer Detection

Breast cancer is a major cause of death among both White and non-White women in the Western world. In the United States in 1977, deaths from breast cancer accounted for 6.1 per cent of all deaths among women ages 30 through 79.[1] Among Whites, breast cancer mortality rates have been stable since 1950, while among non-Whites they have increased steadily. Age-adjusted breast cancer mortality rates are now nearly identical for Whites and non-Whites.

At present the only demonstrably valid method for reducing breast cancer mortality is early detection and treatment of the disease. The efficacy of screening for breast cancer was demonstrated by a controlled trial initiated in

the 1960s by the Health Insurance Plan of Greater New York (HIP). The HIP study was an evaluation of a screening program employing both physical examination and mammography on four occasions one year apart. This program resulted in a one-third reduction in breast cancer mortality through nine years of follow-up among women ages 50 and over but not among younger women.[2]

Although the HIP study provides a basis for optimism regarding breast cancer screening, its findings do not necessarily pertain to programs which use a different screening modality or schedule. Further, it must be acknowledged that breast cancer screening programs can be very expensive. It is also true that some participants in any screening program will experience adverse effects. Women whose test is falsely positive may undergo expensive and potentially harmful diagnostic evaluation, while those whose test is falsely negative are implicitly assured that they do not have disease when, in fact, they do. Even some of the true positives will not be the better off, and perhaps worse, for having had their disease detected early.[3]

Breast self-examination (BSE) is widely advocated as a screening test for breast cancer. As such, BSE has two major advantages: it entails no expense and is performed conveniently at home. On the other hand, BSE has never been evaluated in terms of its sensitivity and specificity, the latter being of special concern. In fact, until recently there were only three scientific evaluations of BSE and their results were contradictory and unconvincing.

Foster, *et al,* reported that among 60 women with breast cancer who claimed to have practiced monthly BSE, 55 per cent had disease in clinical stages 0-I, while among 117 breast cancer cases who did not practice BSE at all, only 19 per cent had clinical stages 0-I.[4] It was also reported that both the mean tumor size and the proportion of women with nodal metastases were smaller among women who practiced monthly BSE. However, Foster's study was criticized because it did not describe the proportion of women practicing BSE who actually found their tumor by BSE. There was also skepticism about the results because women who practice BSE may differ from those who do not with respect to educational background and breast characteristics.[5] Finally, the participation rate was only 73 per cent.

Greenwald, *et al,* conducted a study in which breast cancer cases were classified according to the method of detection (by a physician, by BSE, or by accident). Among 53 women who discovered their tumor through BSE, 38 per cent had disease in clinical stage I, while among 178 women who discovered their tumor by accident, only 27 per cent had clinical stage I disease.[6] However, Greenwald did not report the distribution of tumor stages according to BSE habits among women whose tumor was discovered by a physician or by accident. Another limitation of the study was that only 71 per cent of eligible cases participated.

Smith, *et al,* classified 220 breast cancer cases (80 per cent of those eligible) according to the method of detection (physician vs self). Among the 75 per cent of women who discovered their own tumor, the distribution of pathology stage, involved lymph nodes, and tumor size differed little between those who did and those who did not practice BSE. Both among the women who did and did not practice BSE, the proportion who had early stage disease was an unusually high 59 per cent. The BSE habits of women whose tumor was discovered by a physician were not described.

In summary, three studies have been done; two were "positive" and one was "negative." All three have major limitations including the absence of crucial information. None of the studies addresses the best criterion for evaluating breast cancer screening—namely effects on mortality. And, none of the studies was part of a specific program designed to evaluate BSE.

In addition to recognizing that these three studies failed to establish the value of BSE, it should be acknowledged that BSE may do some harm. How many women experience needless anxiety after performing BSE because they erroneously believe they have detected a cancer? How many aspirations and biopsies are done to evaluate the nonmalignant "lesions" found by women who practice BSE? How many women who practice BSE postpone having a physical examination by a competent examiner? And, as a result of this, how many tumors are found by BSE—but only after they have become relatively advanced? Thus, our judgment had been that BSE was not demonstrably effective and might do some harm and therefore could not be relied upon as a public health procedure.

Fortunately, two recent studies, although also apparently contradictory, can be reconciled with each other and with the previous work. As a result the five available studies, taken together, provide the basis for a moderately positive assessment of BSE.

Huguley and Brown conducted a study that overcame several limitations of previous work.[8] It included 2,083 women with breast cancer (80 per cent of those eligible) diagnosed in 14 hospitals in Georgia during a recent four-year period. Detailed information was obtained on all factors likely to be pertinent to an assessment of BSE. It was found that among women who practice BSE, 29 per cent had disease in pathology stages 0-I as compared to 19 per cent among women who did not practice BSE. However, our interpretation of Huguley's data is that only about 25 per cent of the benefit among BSE women was due to BSE *per se*. An additional 30 per cent of the benefit probably can be attributed to increased detection by a means likely to be enhanced by the practice of BSE, namely detection "by accident." An important finding in this study was that women who practice BSE make more use of mammography than those who do not. In fact, a relatively large proportion of cases among BSE women were actually detected by mammography, a modality which appears extremely sensitive in view of the fact that both among BSE and non-BSE women 61 per cent of cases so detected were of stages 0-I.

In this issue of the Journal, Senie, *et al,*[9] report the findings of another large, well-conducted study. It included 1,216 women with breast cancer (97 per cent of those eligible). These women were all seen at Memorial Hospital in New York City. Information was obtained on the BSE habits of the women, on the method of tumor detection, and on the frequency of medical examinations. It was found that more frequent medical examination, including physical examina-

TABLE 1—Percentage of Women with Breast Cancer Who Have "Early" Disease according to BSE Practice for Each of Four Studies

Study	BSE Practice		Ratio
	No	Yes	
Foster, *et al*[4]	19	45	2.4
Huguley and Brown[8]	19	29	1.5
Senie, *et al*[9]	43	48	1.1
Smith, *et al*[7]	58	59	1.0

tion of the breasts, was significantly associated with smaller tumor size and with the absence of involved axillary lymph nodes. On the other hand, the practice of BSE had little or no relationship to these indices. Finally, Senie also found that, among cases detected by mammography, an extremely high proportion had early stage disease.

We suggest that the results of these two recent studies differ because their frames of reference differ markedly. Of crucial import, in Huguley's study, among women who did *not* practice BSE only 19 per cent had "early" disease whereas the figure is 43 per cent in Senie's non-BSE cases. Thus, a reasonable interpretation of both studies is that among women who use various other breast cancer detection practices the incremental effect of BSE is small. However, among women who use these other services less (such as Huguley's subjects—as evidenced by the 19 per cent figure), BSE has a meaningful role to play in breast cancer detection. This interpretation, in fact, allows four of the five extant studies to be reconciled with one another (see Table 1), and the fifth, Greenwald's study, appears to be consistent but cannot be analyzed in the same way. The table shows that benefit from BSE is restricted to groups who would otherwise have a very low proportion of women with early disease. (The definition of "early disease" differs among the studies. Nonetheless, it is a virtual certainty that, were a common definition to be used, the figures for women who did not practice BSE in the first two studies listed in the Table would remain much lower than those in the second two.)

The interpretation that while BSE can be of value it is less so among women who avail themselves of other types of breast examinations is also supported by the finding in four of the studies that among cases detected by physical examination, as compared to BSE, a higher proportion have early disease (this issue was not addressed by Foster). Further, as was mentioned, both Huguley and Senie report that among cases detected by mammography the proportion that have early disease is higher than it is for cases detected either by physical examination or by BSE (this issue was not addressed in the other three studies).

If one accepts the proposed reconcilement of the existing studies and if one also accepts that both mammography and physical examination are more sensitive detectors of breast cancer than is BSE, a rational policy with respect to BSE can be formulated: Women should be encouraged to conduct BSE but it must be emphasized that BSE is not a substitute for breast examination by a competent examiner or for mammography. Women should also be taught that if BSE is to be of value it must be practiced relatively frequently and proficiently. (Both Huguley and Senie provide evidence that for BSE to have benefit it must be done well.) Looking at the larger picture it seems reasonable to propose that a screening strategy should be formulated for each woman. Depending on her age, mammography and physical examination will have relatively different import but, together, they provide the first line of detection. BSE may then be advocated as a useful supplement to each woman's main strategy but not as a substitute for it.

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Why Do High Surgery Rates Raise Case Fatality Rates?

It was nearly 30 years ago that Lembcke reported that hospital service areas of upstate New York with high appendectomy rates also had high appendicitis death rates.[1] He emphasized that although "the chief purpose of surgical removal of the appendix is to prevent death from appendicitis," the ironic result was that more appendectomies appeared to increase the number of such deaths. Epidemiologists and others interested in medical care have recently