Regionalization. Use of a severity of illness index may be a first step in this direction. Assessing the quality of care may require another approach.

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Adverse Reproductive Outcomes: The Occupational Health Issue of the 1980s

The issue of adverse reproductive effects caused or influenced by the workplace environment gained national interest and concern in the mid- to late 1970s. The issue was brought into focus by a combination of forces and events: the women’s movement, equal employment opportunities, and the sterilizing (temporary and permanent) of male workers exposed to dibromochloropropane (DBCP).1 The latter showed that the problem of adverse reproductive effects transcended the traditional concern of teratogenic effects on the embryo/fetus. The article by Kemminki et al.,2 appearing in this issue of the Journal, on spontaneous abortion in a Finnish town provides interesting and thought-provoking results concerning possible parental occupational influences on the pregnancy outcome variable examined—spontaneous abortion.

Kemminki’s group has produced a landmark study in that they looked at the contribution of both parents to spontaneous abortion. They utilized national hospital discharge data and census tract data in combination to examine the incidence of spontaneous abortions in a small seaside town in Western Finland. They report a significant increase in risk of spontaneous abortions for the combination of women working in the textile industry whose husbands worked in a large metallurgical factory.

These data suggest that two separate factors are acting in a synergistic manner: one on the father and one on the mother. Neither was readily apparent (except for one textile factory) unless the occupations of both husband and wife were merged. There was a statistically significant increase in spontaneous abortions for women who worked in one particular textile facility, which was not seen among all textile factory workers. There was no statistical increase among wives of men in any particular job category.

The elevation in risk of spontaneous abortion observed in this combination of a textile working wife and a metallurgical factory husband suggests that there were separate mutagenic effects on the germ cells of husband and wife which resulted in increased spontaneous abortions when they occurred together. A combination of mutagenic effects on spermatogenesis and teratogenic effects on the embryo could also have occurred. The apparent synergistic aspect of the findings is intriguing but unexplained by the data. The results raise a new issue: of how to study for single effects on either wife or husband without concern for interactive effects.

Another finding of potential significance was the difference in rate of spontaneous abortions between working and non-working women. The effect of any work on spontaneous abortions is too important to ignore. If universally true, the finding is important both for other studies and for decisions of prospective parents in family planning.

Many questions are raised by these working/non-working women’s results, however. Are there socioeconomic factors that differentiate these two groups? Are women working due to dire economic necessity, thus producing an effect of poverty? Do both groups have the same number of children or pregnancies? Are the induced abortion rates different for the two groups, etc.? Are these findings just an artifact due to different rates of hospitalization for spontaneous abortion, as suggested in the article?

While teratogenic effects on the embryo/fetus from maternal exposures have been the traditional concern, there is a growing set of data (in addition to the current paper) which would incriminate mutagenic effects of paternal exposures on spermatogenesis as a cause of adverse pregnancy outcome. Recent studies on DBCP by Kharrazi, et al.,3 and on Waste Water Treatment Plant Workers by Morgan, et al.,4 have shown an increase in the rate of spontaneous abortions among the wives of male workers. In addition, the combined United Kingdom and United States data on waste anesthetic gas exposure (Spence, et al.)5 have shown an increase in congenital abnormalities among children of male anesthesiologists.

An important methodological aspect of the studies by Kharrazi, et al., and Morgan, et al., is that reproductive histories were obtained directly from the wives rather than relying on responses from the husbands about their wives’ reproductive histories. The study by Morgan demonstrates the necessity for such inquiry. The problem at the waste water treatment plant was brought to light by complaints of the men. Each husband had been interviewed about his wife’s reproductive history while she was married to him. Then each wife was interviewed about her reproductive history while married to her current husband. The husbands reported 157 children, the wives 165. The husbands reported 24 spontaneous abortions, the wives 27. Of the reported spontaneous abortions, both parties agreed in 21 cases; however, only in three of 21 was there agreement about the date of the event (within one month). In the other 18 cases, estimates of dates varied up to 20 months apart. Finally,
medical records were reviewed for 26 of the wife-reported spontaneous abortions. Only 20 were actually spontaneous abortions, the other six were some type of dysfunctional bleeding. Morgan's results would indicate that caution must accompany interpretation of husband-reported increase in spontaneous abortions among their wives. Nevertheless, elevated spontaneous abortion risks were first recognized by questioning the men, and the results were confirmed by their wives.

Hemmingi resolved one of the methodologic problems in spontaneous abortion studies by defining a spontaneous abortion as a hospital-diagnosable case. Thus, some objective, observer proof of pregnancy was required. One of the criticisms of this type of criterion is that early pregnancies are missed, since it is generally felt that most spontaneous abortions occur in the first weeks of pregnancy with little or no external objective evidence of pregnancy or abortion.

The use of hospital or medically diagnosable spontaneous abortions as the criterion for case inclusion will underestimate the actual number of cases. If the control and exposed groups both have equal access and tendency to use medical care, the underestimation will not adversely influence the results. On the other hand, this will not be true if one group's access and use of medical care differs from that of the others.

The record linkage methods utilized by Hemmingi are probably currently impossible in the US due to the absence of similar data sources. We can only envy the Finns in their abilities to use national hospital discharge data and census data, and we look forward to other studies done by them on low birthweight, prematurity, and congenital abnormalities. While diagnosis data are used in paying health insurance claims in the US, access to the data is almost impossible and, even if possible, the lack of uniform coding makes it nearly useless for epidemiologic purposes. Furthermore, spontaneous abortion data from hospital records in the US can grossly underestimate the rate of spontaneous abortions in any community in which physicians' practices have changed from uterine evacuation in hospitals for incomplete spontaneous abortions to doing such procedures in the office, emergency room, or clinic.

Interest in detecting adverse occupational influences on reproductive systems for both male and female employees is growing. While cheap, easy surveillance systems have been proposed by Wong, et al., the efficiency of these surveillance methods has yet to be determined. The issues of adverse reproductive effects due to the workplace has just begun; it will be an important issue for the 1980s.

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REFERENCES

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Cosponsored by the University of Maryland, Baltimore County, the Maryland Institute for Emergency Medical Services, and JEMS, the conference will explore the issues of stress and burnout in Emergency Medical Services and Critical Care Medicine personnel. Specific methods of stress reduction will be presented through lectures and workshops.

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