

# High-risk obstetrics

## I. Perinatal outcome in relation to a broadened approach to obstetric care for patients at special risk

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*A special clinical facility was set up to provide exemplary, individualized care to high-risk obstetric patients and to serve as a model to test the effects of broadening the scope and intensity of obstetric supervision. A method of identifying patients at risk was devised and an intensified screening and diagnostic program was instituted. Even among the disadvantaged groups, gradations of risk and variable demands for intensified and expanded care were demonstrated. Previously undetected, underlying ills were encountered in almost one third of the patients. More than one-quarter required antepartal hospitalization for diagnostic work-up and treatment. The finding of improved perinatal salvage rates based on a comparison with this vulnerable group's past obstetric record would seem to justify extending prenatal investigations and concentrating greater effort on those patients at risk.*

MATERNAL mortality rates have undergone progressive and dramatic reductions in the last 30 years. However, perinatal mortality in general has failed to continue falling proportionately, despite considerable improvements in the extent and quality of pre-conceptual, prenatal and neonatal care. It has been suggested by many<sup>1-9</sup> that a relatively small percentage of the obstetric population gives rise to a disproportionately large percentage of these perinatal casualties. Such a group of patients has been called "high risk." If this group of patients could be identified prospectively and then given special care, perhaps a major impact on over-all perinatal loss could be accomplished. Although this concept has existed for some time, few reports are available regarding the prospective criteria for recognition of the "high-risk" patient, the special

aspects of their management, or the results of such management. Over 3 years ago, a special clinical facility was set up to provide exemplary individualized care to such vulnerable patients in our community and to serve as a model to test the effects of broadening the scope and intensity of obstetric supervision. This initial report concerns our first 2 years' practical experiences in dealing with the high-risk obstetric patient, her detection, management, and the results of such management.

### **Guidelines for high-risk obstetric care facility**

A facility for the care of these special problem cases was established in such a manner as to fulfill the following objectives:

1. Ready availability to serve the needs of the entire community and geographic area, both private and ward patients, simply by physician referral. Private physicians were encouraged to become a team member in providing care.
2. Maximum staff-patient ratio to allow for in-depth care.

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3. Full-time social worker-psychologist and nutritionist personnel within the framework of the facility.

4. Experienced obstetricians who have special experience, background, interest, and expertise in the management of these types of problems.

5. Consultant services covering all other fields of medicine readily available to the facility.

6. Specially planned facility for inpatient antenatal evaluation, parturition, and neonatal care geared to the special needs of this unique type of patient.

7. Readily available perinatal research laboratory facility to provide maximum patient evaluation and assistance.

8. Adequate follow-up facility and biostatistical support to establish immediate and long-term results of management.

A major effort was made to assure that the entire staff was highly motivated to provide maximum patient support by adopting a team approach and that the emotional as well as physical needs of each patient be met on an individual basis.

### Selection of the high-risk patient

Certain patients are readily identified as representing greater risks of perinatal loss; those with consistently poor past pregnancy performance or clearly significant medical or obstetrical ills. These clinically determined factors have been, to date, the listed indication for referral to the facility in over 80 per cent of our registrants.

In an effort to evaluate objectively all these factors, a scoring system was devised and applied prospectively to over 1,000 ward prenatal patients. In addition to obvious serious medical conditions and past problems, an effort was made to consider more subtle factors, i.e., socioeconomic status, psychological adjustment, age, marital status, etc., which in various combinations and in an additive manner may be associated with significantly greater risk and therefore justify special care. A score sheet which takes all these factors into account was made out at the patient's first prenatal visit. Factors judged to be inimical to perinatal health were grouped into eight major categories and given significance on a scale in accordance with arbitrarily assigned penalties. The index score represented the numerical value resulting from the sum of all assessed penalties subtracted from a perfect score of 100. Upon completion of the pregnancy, the score was compared with the ultimate outcome of that pregnancy. The gross results are presented in Table I. It can be seen that a relatively small group of patients with objectively low scores can be identified and that this group carries a much greater risk of perinatal problems. Indeed, this small group contributes about one half of the complications of pregnancy and pregnancy wastage. A more detailed analysis is in preparation but the scoring system appears to be a significant adjunct to clinical judgment in the selection of the high-risk patient, particularly since it gives semiobjective weight on a relative basis not

Table I

Perinatal outcome	Totals		High-risk		Moderate-risk		Low-risk	
	No.	%	No.	%	No.	%	No.	%
Mortality	40	4.01	20	6.78	12	3.08	8	2.56
Abortion	10	1.00	7	2.37	3	0.77	0	0.00
Fetal death	17	1.71	9	3.05	4	1.03	4	1.28
Neonatal death	13	1.30	4	1.36	5	1.28	4	1.28
Survivals	957	95.99	275	93.22	378	96.92	304	97.44
Morbidity at birth	58	5.82	27	9.15	20	5.13	11	3.53
Normal course	899	90.17	248	84.07	358	91.79	293	93.91
Totals*	997	100.00	295	100.00	390	100.00	312	100.00

\*Four cases of unknowns were excluded (total 1,001 patients). (From Nesbitt, R. E. L., Jr., and Aubry, R. H.: *Am. J. Obst. & Gynec.* 103: 972, 1969, Table VII.)

only to the more obvious conditions but also to the subtle factors. This scoring system is now used in conjunction with clinical judgment in the selection of patients for our facility.

Analysis of the patients actually referred to our facility is of interest (Table II). The spectrum of clinical problems present in these patients is as varied as it is serious (Table III).

**Table II.** General characteristics of high-risk patients referred to our facility

Source of referral:	Hospital clinics —84%
	Private physicians—16%
Age: mean 27.5 years	<20 9%
	20-29 57%
	30-34 19%
	35-39 10%
	>39 5%
Race: White	66%
Nonwhite	34%
Unwed (single or separated)	25%
Average No. of previous pregnancies	4.2
Average MCH index score	44

**Table III.** Problem for which patient referred or found during care (some patients with multiple problems)

<i>Prior pregnancy wastage</i>	63
Habitual abortion	18
Repeated premature infants	45
<i>Medical ills</i>	
Chronic hypertension	39
Diabetes	29 (A-15, B-10, C-4)
Bacteriuria	35
Heart disease	22
Anemia	16
Endocrine disorders	16
Hypothyroid	11
Hyperthyroid	2
A-G syndrome	3
Chronic renal disease	5
Chronic pulmonary disease	4
Active tuberculosis	2
Severe obesity	5
<i>Psychiatric problems</i>	4
<i>Obstetric ills</i>	
Sensitized Rh problems	8
Uterine anomaly	6

### Special aspects of high-risk obstetric care

In addition to meticulous attention to the generally accepted aspects of prenatal care, some of the special features of the program are worthy of mention:

**Social worker-psychologist support.** All patients had a thorough socioeconomic evaluation initially and psychosocial assistance throughout the period of care. Since 84 per cent of the patients were indigent, special emphasis upon the psychosocial aspects of care was essential. In addition, because these workers represent an integral part of the medical team planning care, they are of invaluable assistance in apprising physicians of the in-depth psychosocial aspects of the patients' medical problems and of progress relative to patient acceptance, understanding, and cooperation with respect to recommended management.

**Nutritionist.** All patients had an initial nutritional analysis and subsequently received advice at frequent intervals regarding optimum dietary habits. This was especially helpful in two respects. It revealed that fully 70 per cent of our patients had grossly inadequate diets, particularly in regard to protein intake, many of whom ingested less than 60 Gm. per day. It was also helpful in planning management and in assuring patient compliance with special diets, i.e., diabetic, low sodium, etc.

**Consultant services.** Specialists in pediatrics, internal medicine, endocrinology, cardiology, psychiatry, and renal and pulmonary disease were often called in as needed to participate in the patient care. Of the patients who have thus far completed pregnancies, 54 or 35 per cent have had consultation services provided within the framework of the high-risk facility. Having the consultant as an integral part of the team care has obvious logistic and psychological advantages for the patient. In addition, it has provided a mutually advantageous educational atmosphere for both consultants and the obstetric staff as well as for residents and students.

**Inpatient evaluations.** In line with the

policy of providing a continuum of optimum care, liberal use of hospital admission was made during the prenatal course for diagnostic as well as therapeutic purposes. Among those who have completed their pregnancies, 41 or 27 per cent had inpatient evaluations and/or therapy during the prenatal period. The rewards in terms of detecting underlying ills and in programming treatment in accordance with a smooth transition between out- and inpatient care have become obvious.

**Expanded screening procedures.** In addition to the usual laboratory work considered routine for prenatal care, other tests were applied to all the registrants.

*Two-hour postprandial blood sugar and/or glucose tolerance tests.* By routinely applying these screening techniques, 12 previously undiagnosed cases of diabetes among this high-risk population were found. This represents 10 per cent of the group at risk and is to be compared to 3.0 per cent in the routine prenatal clinics.

*Bacteriuria screening.* Using the technique and criteria of Kass, 28 patients with previously undetected bacteriuria were found. This represents 19 per cent of the patients at risk and is to be compared to a 4 per cent bacteriuria rate in our routine prenatal clinic.

*Thyroid screening.* By performing routine determinations of serum free thyroxine and pursuing any abnormalities found with further thyroid studies, 6 cases of previously undetected hypothyroidism were found. It is of interest that 4 of these patients had histories of repeatedly delivering low birth weight infants and the other 2 were habitual aborters.

*Cytohormonal screening.* All patients had serial colpocytograms as well as serial 24 hour urine assessments of total estrogens, pregnanediol, and quantitative chorionic gonadotropins. The detailed results of these studies are to be reported separately; however, a few generalizations can be made. Among the patients with prior pregnancy wastage, fully one-third had at least one of the four cytohormonal parameters which were consistently outside of the normal range for pregnancy. In the total group of patients, including

hypertensive and diabetic patients, use was made of the cytohormonal studies primarily for prognostic purposes. In only 21 patients were the results used to influence therapy. In 19 of these patients (12 hypertensive, 7 diabetic), normal cytohormonal values in association with favorable clinical features allowed us more safely to postpone artificial induction of labor temporarily to achieve greater fetal maturity. In all of these patients, subsequent delivery yielded living healthy infants, thereby corroborating the normal cytohormonal assessment. In only 2 patients, both hypertensive, were inductions carried out, largely because of increasingly abnormal cytohormonal values. Both infants survived. One showed distinct evidence of dysmaturity. The other was normal except for being less than the expected weight for gestational dates (2,205 grams at 37 weeks).

Therefore, by pursuing an aggressive approach toward the total evaluation of patients referred to the high-risk facility, a significant list of previously undetected abnormalities were detected (Table IV).

#### Results of high-risk obstetric care

The over-all results of this aggressive approach to high-risk pregnancy care is depicted in Table V. Since a control series is not feasible, we have used the patient's own past obstetric history as the only available means of evaluating the results of therapy in this uniquely complicated group of cases. Despite serious limitations of method, certain aspects of the comparison are of note.

**Table IV.** Problems first picked up in special screening studies

Diabetes	
Class A	10
Class B	2
Bacteriuria	28
Hypothyroid	6
Uterine anomaly	5 (3 of which were found at time of delivery)
Chronic renal disease	3
Chronic lung disease	3
Organic heart disease	4

Table V

	<i>Previous pregnancies</i>	<i>High-risk care</i>	<i>New York State (urban +)</i>	<i>United States*</i>
Total pregnancies	662	153		3,760,538 live births
Abortions	23%	10%		10%
Low birth weight (< 2,500 grams)	23%	17%		8.3%
% Low birth weight infants at term (> 36 weeks)	34%	55%		
Fetal death in utero/1,000 live births (20 weeks' gestation to delivery)	78	22	32 (W-26) (NW-52.7)	16.2 (W-13.9) (NW-27.2)
Neonatal death/1,000 live births (birth to 28 days of age)	132	44	18.9 (W-15.8) (NW-29.1)	18 (W-16.1) (NW-25.4)
Perinatal mortality/1,000 live births (20 weeks' gestation to 28 days after birth)	210	66	51 (W-42) (NW-82)	34 (W-30) (NW-53)

\*Vital Statistics, 1965.<sup>8</sup>

The lower abortion rate in current pregnancies is striking but probably cannot be attributed to care because it was unusual for patients to register with us before 10 weeks of pregnancy. It may simply mean that those patients with frequent abortions in the past who progressed far enough in their pregnancy to be referred already had a better prognosis for their present pregnancy. Indeed, a 10 per cent abortion rate among patients registering after 10 weeks of pregnancy probably still reflects a higher than average abortion rate for the population at large.

The rate of low birth weight infants, although high among this group under study, is appreciably less than these patients had experienced in the past. It is of particular interest that the percentage of low birth weight infants born after 36 weeks of pregnancy was higher than the rate for past such occurrences. This suggests that the apparent extension of gestation in these patients was not accompanied by a comparable improvement or maintenance of optimal placental sufficiency. Nevertheless, despite this feature, there was a lowering of the incidence of neonatal mortality as compared with past performance.

The fetal and neonatal death rates are

both dramatically lower during current pregnancies than in past events; however, the persistent, disproportionately high ratio of neonatal/fetal deaths undoubtedly reflects the composition of our select group of patients (habitual aborters, repeated prematures, bacteriuria, etc.). The total perinatal mortality in this highly vulnerable group is roughly comparable to the rate prevalent in urban centers in general in New York State where a broader spectrum of patients are encountered. This satisfactory record is particularly impressive when adjustments are made for the higher nonwhite proportion in

Table VI

Rh sensitization—2 fetal deaths (26, 30 weeks) 1 neonatal death (during exchange transfusion)
Prior pregnancy wastage—2 neonatal deaths (600, 1,400 grams)
Diabetes—2 neonatal deaths (1 anomaly incompatible with life, Class B) (1 aspiration pneumonia, Class A)
Chronic hypertension—1 fetal death (superimposed pre-eclampsia at 36 weeks)
Bacteriuria—1 neonatal death (abruptio placentae, on anticoagulants for phlebitis)

Table VII

	<i>Previous pregnancies</i>	<i>High-risk care</i>	<i>United States</i>	<i>New York State</i>	<i>New York State urban</i>	<i>Onondaga County</i>	<i>Syracuse</i>
Total pregnancies	662 (471 live-born)	153 (135 live-born)	3,760,358 live-born	336,634 live-born	—	9,564 live-born	4,376 live-born
Abortions	23%	10%	10%	—	—	—	—
Prematurity	23%	17%	8.3% (W-7.2) (NW-13.8)	8.9 (W-7.6) (NW-15.4)	—	—	—
Stillborn rate/ 1,000 live births	78	22	16.2% (W-13.9) (NW-27.2)	26 (W-21.1) (NW-51.1)	32 (W-26) (NW-52.7)	13 (W-12) (NW-24)	15 (W-14) (NW-25)
Neonatal deaths/ 1,000 live births	132	44	18 (W-16.1) (NW-25.4)	17.5 (W-15.3) (NW-28.8)	18.9 (W-15.8) (NW-29.1)	17 (W-16) (NW-24)	19 (W-16) (NW-25)
Perinatal mortality	210	66	34 (W-30) (NW-53)	43 (W-36) (NW-79.9)	51 (W-42) (NW-82)	30 (W-28) (NW-48)	34 (W-30) (NW-50)
Perinatal mortality corrected for anomalies	191	59	—	—	—	—	—
Living	79%	93.4%	96.6%	95.7%	94.9%	97%	96.6%

our group than in urban centers as a whole.

The results of therapy for specific disorders within the total group loses significance because of the small numbers involved. However, it is of interest to note salvage rates in a few representative conditions: Rh sensitization, 62 per cent; prior pregnancy wastage, 97 per cent; chronic hypertension, 97 per cent; diabetes, 93 per cent.

The perinatal losses are described in Table VI.

Thus, even under optimal circumstances, high-risk patients can be expected to contribute substantially to reproductive inefficiency and much work is needed to establish more effective programs of management (Table VII).

#### Comment

The failure of standard prenatal care to further decrease the incidence of reproductive failure represents a great challenge to modern medicine. The relatively unfavorable ranking of the United States with respect to many other countries in perinatal mortality<sup>40</sup> makes the challenge more pressing. It has

been suggested by many that one practical approach to the problem would be to identify and give special care to those patients who seem for varying reasons to be particularly prone to reproductive loss.

The results of our efforts to use a semi-objective scoring system to augment clinical judgment in the prospective identification of the high-risk patient seem promising. It is too much to expect that all or even the vast majority of pregnancy wastage can be predictable in advance; however, by the methods employed, we have succeeded in identifying a minority group of ward service patients who experience a twofold increase in poor outcomes. It is obvious that even among the disadvantaged groups there are gradations of risk and variable demands for intensity of care.

The percentage of patients giving rise to low scores would undoubtedly be lower if patients were drawn from the community at large. For instance, a small sample of 200 private patients yielded low scores in only 13 per cent of the cases. Based on these results and the relative proportion of private

versus ward patients in our community, it is estimated that about 20 per cent of all patients comprise the high-risk group who merit intensive care. Regardless of the method of identification of such a group, it is our view that these patients should receive care especially tailored to their particular needs. This demands a comprehensive, multidisciplinary approach under the supervision of a highly motivated, experienced medical-paramedical team, working with the most modern facilities and techniques and having available to it a well-supported biomedical laboratory. Expanded inpatient accommodations are likewise required to support these broadened obstetrical programs as evidenced by the need for antepartal admissions to the hospital in more than one quarter of the patients in this study.

In regard to the type of care provided, some of our experiences indicate the importance of more aggressive use of screening procedures of various types. The number of previously undetected, underlying ills is especially noteworthy in that almost one third of patients had such disorders. The public health and preventive medical significance of such successful screening methods has potential impact not only for improved perinatal salvage rates but also upon the general health of females in the population, particularly the socially deprived. For the latter group, expanded education, creation of proper health habits, emotional support, and provisions for continuity of care were gratifying additional dividends of this effort which may have lasting gains beyond the satisfactory immediate results.

This broadened approach to obstetric care represents only part of the needed effort if reproductive losses are to be further curtailed. Maximal reductions in perinatal wastage will be better achieved as the emphasis is shifted toward preconceptional care, genetic counseling, responsible family planning, and improved community health. To the extent possible, the activities and functions of the clinic have been broadened to encompass these essential features. In addition, it is realized that the dividends of obstetric care must be weighed not only in relation to perinatal survival but also to morbidity, both immediate and remote. Thus, long-term follow-up, supervision and care of the offspring are mandatory and facilities for this broadened effort must be made available on an expanded basis. There must be close liaison between the obstetric facility and the newborn, growth and development, and comprehensive pediatric clinics. The handicapped child of today will inevitably constitute the high-risk obstetric patient of tomorrow if her problems are not detected and dealt with successfully before she embarks upon her reproductive career. No artificial barriers between disciplines or arbitrary segregations by age should be allowed to impair the general supervision and preventive care of females on a continuing basis prior to and during the reproductive years.

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#### REFERENCES

1. Nesbitt, Robert E. L., Jr., Aubry, Richard H., Goldberg, Edward M., and Jacobs, Ross D.: *Am. J. Obst. & Gynec.* **93**: 702, 1965.
2. Nesbitt, Robert E. L., Jr., and Aubry, Richard H.: *Hosp. Med.* **3**: 43, 1967.
3. Clifford, S. H.: *New England J. Med.* **271**: 243, 1967.
4. Jacobson, Howard N., and Reid, Duncan E.: *New England J. Med.* **271**: 302, 1964.
5. Butler, Neville R.: *Perinatal Mortality; the First Report of the 1958 British Perinatal Mortality Survey*, Edinburgh, 1963, E. & S. Livingstone, Ltd.
6. Griswold, Don M., and Cavanagh, Denis: *Am. J. Obst. & Gynec.* **96**: 878, 1966.
7. Newcombe, Howard B.: *Canad. M. A. J.* **98**: 189, 1968.
8. *Vital Statistics of the United States, 1965. Vol. I, Natality; Vol. II, Mortality, Part B.*
9. Chase, Helen C.: *Am. J. Pub. Health* **57**: 1735, 1967.
10. Chase, Helen C.: *Vital & Health Statistics, United States Department of Health, Education, and Welfare, Series 3, No. 6*, 1967.

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