Prenatal risk assessment and obstetric care in a small rural hospital: comparison with guidelines

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An assessment was made of the potential usefulness in a small rural hospital of the guidelines for prenatal risk assessment and management of the Newfoundland and Labrador Prenatal Record, a form similar to that in use in other provinces. A retrospective chart review was done for 266 pregnancies followed at the Baie Verte Peninsula Health Centre prior to the introduction of the guidelines. The pattern of practice was to request consultation and to transfer patients for delivery less often than was suggested by the guidelines; only 32% of patients at risk were assessed by an obstetrician. By the time of delivery only 39% of the patients were at no predictable risk according to the guidelines. Nevertheless, neonatal morbidity was present in this group (4% of the infants had an Apgar score of 6 or less at 1 or 5 minutes), though less often than in those at risk (18% of the infants had a low Apgar score). However, the group at no predictable risk required nonelective intervention in 40% of cases, approximately the same rate as that for the group at risk. It is necessary for some small hospitals to have the facilities and the trained staff to handle the problems that occur even in low-risk patients. To maintain the delivery rate necessary to retain skills, the guidelines may help family practitioners and consulting obstetricians to select some patients at risk who can be managed in small hospitals.

On a évalué l'utilité potentielle dans un petit hôpital rural des directives du Dossier prénatal de Terre-Neuve et de Labrador concernant l'évaluation des risques prénatals et les soins aux patientes à risque; ce formulaire est similaire à ceux qui sont utilisés dans d'autres provinces. Une étude rétrospective a été faite des dossiers sur 266 grossesses suivies au Centre de santé de Baie Verte Peninsula avant l'instauration des directives. Il en ressort qu'il y avait moins de demande de consultation et moins de transfert pour l'accouchement que ne le conseillent les directives; seulement 32% des patientes à risque ont été examinées par un obstétricien. Au moment de l'accouchement seulement 39% des patientes ne montraient aucun risque prévisible d'après les directives. Néanmoins, il y avait morbidité néonatale chez ce groupe (chez 4% des bébés l'indice d'Apgar était de 6 ou moins après 1 ou 5 minutes), bien que moins souvent que pour les sujets à risque (chez 18% des bébés l'indice d'Apgar était bas). Cependant, chez le groupe à aucun risque prévisible une intervention non élective était nécessaire dans 40% des cas, soit environ le même taux que pour le groupe à risque. Certains petits hôpitaux devraient posséder des équipements et un personnel entraîné pour faire face aux problèmes qui surviennent même chez des patientes à faible risque. Afin de conserver un nombre d'accouchements suffisant pour maintenir la compétence, les médecins de famille et obstétriciens consultés pourraient se servir des directives pour choisir certaines patientes à risque qu'on pourrait soigner dans un petit hôpital.

Family physicians practising in small hospitals play an important role in perinatal care. In Canada in 1980 approximately 40 000 deliveries occurred in hospitals that were unlikely to have specialized facilities since they handled less than 400 deliveries per year. Indeed, of the 40 000 deliveries, 30% took place in hospitals recording less than 100 deliveries per year.[1]

The challenge of providing obstetric care in the small hospital setting has been approached in different ways. Some studies have concluded that the management of low-risk pregnancies by family physicians was appropriate and safe.[2-9] However, the possibility of unexpected complications developing in such pregnancies has also been recognized.[10,11] Consensus groups have attempted to define the function and educational needs of the family physician practising obstetrics.[12] Regionalization of perinatal services, a concept designed to make optimal care available to all patients, has been found to enhance the quality of care in small hospitals.[13-17] This approach depends on the accurate assessment of risk factors in pregnancy. Prenatal screening allows the family physician to selectively refer patients for management or delivery, or both, to a more appropriate secondary or tertiary care centre. Although various methods of such risk assessment have been proposed, a consensus has not yet been reached on a simple, reliable screening technique applicable to the small hospital setting.[18-23]

In 1981, guidelines for risk factor assessment and subsequent patient management, based on the scoring system of Goodwin and colleagues,[18] were introduced into clinical practice in Newfoundland. The guidelines, accompanied by a standardized prenatal record, were distributed to all physicians providing prenatal care in the province.

In this paper we describe the potential implications and usefulness of these guidelines in a small rural hospital, as assessed by a study of the risk factors, patient management and outcome in an obstetric practice prior to the introduction of the prenatal record.

Methods

Our study was done at the Baie Verte Peninsula Health Centre (BVPHC), a 40-bed hospital that is the only source of primary care for 12 000 people in 21 remote coastal villages. All women at more than 20 weeks' gestation who were followed at the BVPHC and whose infants were delivered either at the BVPHC or at a secondary care centre between July 1, 1980 and Dec. 31, 1981 were included in the study. The 18-month study period immediately preceded the introduction of the Newfoundland and Labrador Prenatal Record into clinical practice. We used the guidelines associated with the record to retrospectively assign grades of risk to patients according to problems documented in their charts at three times: at the initial visit, prior to labour and at the time of delivery. Following the suggestions in the record, patients at a grade B risk were subdivided into those with one risk factor (B_1) and those with two or more risk factors (B_{2+}). Information on management and outcome was obtained from the patients' charts at the BVPHC or the referral centre. We compared actual patient management, in terms of prenatal consultation with an obstetrician and referral for delivery, with the management suggested by the guidelines. We assessed the outcomes of different groups in terms of the need for intervention during labour, delivery and the postpartum period, and neonatal morbidity and mortality.

Throughout the study period the ability to perform operative delivery (vacuum extraction, forceps delivery and primary and repeat cesarean section) was maintained at the BVPHC by six family physicians, each with extra training in obstetrics, surgery or anesthesia. The blood transfusion service was available on a 24-hour basis. Fetal distress was diagnosed by auscultation as electronic monitoring was not available. Neonatal resuscitation, if required, included intubation, manual ventilation and intravenous cannulation.

Antepartum consultations with an obstetrician were carried out by phone, letter, office visit or admission to a secondary care centre. Referrals for delivery required transfer to a secondary care centre, staffed by two obstetricians and one pediatrician, 180 km away by road. Neonatal transport to a tertiary care centre 610 km away was possible by air in good weather.

Results

During the 18-month study period 266 patients delivered beyond 20 weeks' gestation. Table I shows the risk factors and the recommendations for management in this group as suggested by the Newfoundland and Labrador Prenatal Record.

Table II shows the numbers of patients at risk at three times during their pregnancy. An overall trend towards increased risk with advancing gestational age is demonstrated. Initially, 36% of the patients were assessed to be at grade B or C risk, compared with 61% at the time of delivery. Of the 32 patients at grade C risk at the time of delivery, 20 had been at grade A risk at the time of the initial assessment, and 8 of the 20 were still at grade A risk prior to labour. These eight patients were changed to grade C risk because of prolonged

Table I—Prenatal risk factors according to grade of risk and recommendations for management outlined in the Newfoundland and Labrador Prenatal Record	
Grade of risk and risk factor*	No. of patients†
A: no predictable risk	NA‡
B: at risk	
Maternal obesity (75 kg or greater at first visit)	38
Pregnant for 42 weeks or more	34
Hypertension	29
Mild pre-eclampsia 19	
Hypertension alone 10	
Previous cesarean section	25
Significant tobacco intake (20 or more cigarettes a day)	23
Breech or malpresentation	14
Antepartum hemorrhage, ceased	13
Weight gain of less than 4.5 kg by 30 weeks' gestation	13
History of premature labour, stillbirth, neonatal death or intrauterine growth retardation	8
Anemia (hemoglobin level less than 100 g/L with iron supplement)	5
Premature labour, controlled	4
Diabetes mellitus, class A or B[24]	3
Primigravida aged less than 16 or more than 34 years	3
Multiple pregnancy	2
Hydramnios	1
Family history of genetic or metabolic disease	1
Cervical incompetence	0
Significant drug/ethanol intake	0
Rh immunization	0
Renal disease	0
Recommendation: Consultation with an obstetrician should be obtained, and the patient should usually be transferred to the regional hospital for delivery.	
C: high risk	
Premature labour (at 36 weeks or less of gestation), uncontrolled	14
Prolonged rupture of membranes (before labour, requiring induction or augmentation)	9
Severe fetal growth retardation (growth at less than the 10th percentile)	5
Antepartum hemorrhage, continuing	4
Premature rupture of membranes (at less than 36 weeks' gestation)	3
Hypertension with superimposed pre-eclampsia	3
Severe pre-eclampsia	2
Diabetes mellitus, class C, D, F or R[24]	0
Renal disease with hypertension	0
Heart disease	0
Recommendation: Whenever possible, the patient should be transferred to the regional hospital for intensive care and delivery.	
N: newborn at risk	
Previous severe respiratory distress syndrome, seizure disorders, Hirschsprung's disease, cystic fibrosis, congenital anomalies	5
Recommendation: Delivery in a high-risk centre should be considered.	

*Our definitions are given in parentheses. None were provided in the Newfoundland and Labrador Prenatal Record.
†Some patients had more than one risk factor.
‡NA = not applicable; see Table II for distribution of these patients.

rupture of the membranes requiring induction or augmentation (in four patients), uncontrolled premature labour (in three), at 27, 31 and 34 weeks' gestation, and abruptio placentae (in one). The patients at grade B risk prior to labour who were at grade C risk at the time of delivery were changed because of premature labour (in nine patients), severe pre-eclampsia (in four), prolonged rupture of the membranes (in two), and sepsis and abruptio placentae (in one patient each). The increase in the numbers of patients at B_{2+} risk from the initial assessment to the assessment before labour was mostly attributable to mild pre-eclampsia, undefined antepartum hemorrhage, postdate pregnancy or poor weight gain.

Table II—Retrospective assessment of grade of risk in 266 patients

| Grade of risk | Time of assessment; no. (and %) of patients | | |
	Initial visit	Prior to labour	At time of delivery
A	170 (64)	128 (48)	103 (39)
B_1	80 (30)	85 (32)	87 (33)
B_{2+}	16 (6)	46 (17)	44 (16)
C	0 (0)	7* (3)	32 (12)

*A total of 14 patients were at grade C risk at some point before labour and delivery; however, in 7 the problems (e.g., premature labour) were reversible, so the patients were given a lower grade of risk.

A total of 32% of the patients at risk grades B, B_{2+} and C were assessed by an obstetrician at some time during pregnancy. Table III shows the percentages of patients according to grade of risk that were assessed by an obstetrician or transferred for delivery to the secondary care centre. The most common reasons for the prenatal consultations included hypertension, controlled antepartum hemorrhage, suspected intrauterine growth retardation or postdate pregnancy. The most common reasons for transfer for delivery to the secondary care centre were prematurity and pre-eclampsia. Of the patients transferred to the secondary care centre, three (two with pre-eclampsia and one with placenta previa) refused to remain there until delivery and subsequently returned to the BVPHC.

Table IV gives the numbers of patients needing nonelective intrapartum intervention according to grade of risk. Nonelective intervention was necessary in 95 patients, 40 of whom were at grade A risk at the time of delivery. These 40 patients represent 39% of all the patients at grade A risk; the total rates of intervention in the patients with higher grades of risk were no greater than those in the low-risk patients. Management of fetal distress was necessary in 23 of the 231 patients in labour. Of the 23, 12 were at grade A risk. Nonelective operative delivery included 14 forceps deliveries, 23 vacuum extractions and 28 cesarean sections and was done in 21% of the patients at grade A risk. In the immediate postpartum period the patients at grade

Table III—Prenatal consultation and transfer for delivery according to grade of risk at the time of referral

| Grade of risk | No. of patients at risk at some time during pregnancy* | No. (and %) of patients | | |
		Having prenatal consultations with an obstetrician	Transferred for delivery	Assessed by an obstetrician†
A	170	8 (5)	1 (1)	8 (5)
B_1	134	19 (14)	13 (10)	25 (19)
B_{2+}	49	13 (26)	9 (18)	16 (33)
C	34	9 (26)	15 (44)	17 (50)

*Not including patients at higher risk after transfer for delivery.
†Some patients were both seen for prenatal consultation and transferred for delivery.

Table IV—Numbers of patients requiring nonelective intervention according to grade of risk at the time of delivery

| Grade of risk | No. of patients in labour | No. (and %) of patients requiring nonelective intervention | | | |
		During labour*	During delivery†	Post partum‡	Total§
A	103	17(17)	25(24)	11(11)	40(39)
B_1	75	10(13)	31(41)	5 (7)	33(44)
B_{2+}	29	2 (7)	5(17)	6(21)	11(38)
C	24	2 (8)	11(46)	2 (8)	11(46)
Total	231	31(13)	72(31)	24(10)	95(41)

*Includes augmentation of labour and management of fetal distress prior to delivery.
†instrumental delivery, cesarean section during labour, and management of shoulder dystocia.
‡Includes neonatal resuscitation, manual removal of a retained placenta, management of uterine atony, and repair of a third-degree laceration of the external anal sphincter.
§Some patients required more than one intervention.

A risk accounted for 46% of the interventions, including 4 of 12 blood transfusions.

Table V compares the patients' grade of risk with neonatal outcome. There were 28 neonates requiring specialist care for complications such as asphyxia, meconium aspiration and transient tachypnea. Most of the patients were at grade C risk, and three were at grade A risk at the time of delivery. The two stillbirths in patients at grade A risk were unexplained and were not associated with complications of labour or delivery. The other patient who had a stillborn infant was at grade B_{2+} risk because she had a history of premature labour and stillbirth and of cesarean section. She had had no problems with this pregnancy and she had not been assessed by an obstetrician. An autopsy did not reveal the cause of the stillbirth. The two neonatal deaths were associated with spontaneous premature labour. The first occurred in a patient at grade A risk prior to labour who presented at 27 weeks' gestation fully dilated and with a breech presentation. There was difficulty delivering the vertex, and the baby died after an hour of resuscitation attempts. The second neonatal death occurred in a patient who had been placed at grade B risk prior to labour because she was a 15-year-old primigravida. She presented at 30 weeks' gestation with possible rupture of the membranes, polyhydramnios and pre-eclampsia. She was transferred to the secondary care centre before labour began, and delivered a baby that died shortly after birth. The baby was described as edematous; autopsy showed intracranial hemorrhage but no gross malformation.

Of the five patients at grade N risk one was seen in antepartum consultation by an obstetrician. In one of the four who were not seen by an obstetrician the newborn had hydrocephalus and other abnormalities and died at 10 weeks of age.

The perinatal mortality rate (defined by Statistics Canada as the number of stillbirths at 28 weeks' or more gestation and neonatal deaths within the first week of life per 1000 population) was 18.8 in our study, compared with 10.0 in Newfoundland and 10.8 in Canada.[25]

Discussion

The results of our study are helpful in determining the potential usefulness and the implications of the guidelines for prenatal risk assessment as seen from the perspective of a small rural hospital. The characteristics of the primary care obstetric practice we studied (the BVPHC) were such that 61% of the patients had one or more of the risk factors listed in the guidelines.

The point at which a risk factor appears during pregnancy is of great importance in an isolated practice. For example, it is more difficult to obtain a consultation and to transfer a patient once labour has begun. While a large proportion of the increase in risk occurs prior to the onset of labour, some increase occurs during labour. This increased risk may be due to unpredictable conditions, such as premature labour or hemorrhage, which may make transfer to a secondary care centre, as suggested by the guidelines, unfeasible. In addition to considering the risk of delivery during transport, physi-

cians in rural areas must deal with other problems, such as the absence of any means of transport under adverse weather conditions, the refusal of patients to follow suggestions of referral, and community expectations of the level of service provided in the small hospital. Although in-utero transfer of the fetus at risk is preferable[26,27] it may not always be possible.

The results in Table III demonstrate that the pattern of practice before the introduction of the guidelines was to consult and transfer less often than is now suggested by the guidelines. Conclusions regarding perinatal morbidity and mortality are limited by the small number of patients in and the design of our study. The literature comparing the rates of morbidity and mortality in small hospitals with those in larger centres is also limited, but Richards and Richards[28] have shown that the morbidity rates among mothers and infants following cesarean section were comparable in rural and urban hospitals.

The most important conclusion from Tables II and III is the potential effect of the guidelines. There would be a major shift in the pattern of practice if the guidelines were followed. For example, approximately 60% of the patients in our series would have been transferred for delivery to the secondary care centre, and only the 103 patients at no predictable risk at the time of delivery would have remained at the BVPHC to deliver. The minimum delivery rate necessary to maintain skills and facilities in a small hospital would differ from setting to setting, but we feel that the above delivery rate, about 70 per year, would compromise quality at the BVPHC.

The interventions noted in Table IV were chosen because of their clinical relevance in the small hospital setting. They represent the need for extra training, continuing experience and facilities that may be difficult to obtain in this setting. The term nonelective is used in the sense that the circumstances requiring these interventions demanded an urgency that made transport to a specialist's care difficult or impossible. It would be helpful if the guidelines were effective in identifying patients who are likely to need these interventions so that they could be referred to a secondary care centre.

We found that the rate of nonelective interventions was the same in the patients at no predictable risk and those at risk. Use of the guidelines would not lead to a reduction in the proportions of patients requiring such intervention in the small hospital. Primary care physicians would therefore be confronted with serious complications even in patients at low risk.

Although grade of risk evidently does not correlate

Table V—Comparison of patients' grade of risk with neonatal outcome

Patients' grade of risk at time of delivery	No. of infants	Outcome; no. (and %) of infants		
		Apgar score ≤ 6 at 1 or 5 min	Stillbirth	Neonatal death
A	103	4 (4)	2 (2)	1 (1)
B₁	87	16 (18)	0 (0)	0 (0)
B₂₊	44	5 (11)	1 (2)	0 (0)
C	32	9 (28)	0 (0)	1 (11)

well with the need for nonelective intervention,[20-22] our findings do support those of other studies of prenatal risk assessment systems[18,29-31] that fetal risk can be more reliably predicted. In our study only 4% of the infants of patients at grade A risk had low Apgar scores, compared with higher percentages of infants of patients at other grades of risk. However, this reliability is also limited. The patients at grade A risk would still have had two of the three stillbirths and one of the two neonatal deaths.

The usefulness of the guidelines in the prenatal record also depends on the practical limitations of current regionalized perinatal care.[32] Identification of risk factors can be expected to be more reliable with systematic prenatal assessment than when it is based on clinical impression.[23] However, if all patients at risk are referred for delivery, the ability of the small hospital to provide perinatal care may be jeopardized if the resulting volume of patients declines below the levels necessary to maintain skills and facilities.[20] If the guidelines can be used to involve the obstetrician in management decisions, then delivery by the primary care physician may be appropriate for some patients at risk in order to maintain those skills and facilities. In the small rural hospital setting, this approach would depend on the maintenance of adequate facilities and professional training. It is apparent from our study that these requirements are necessary even in an obstetric practice intended to deal only with patients at low risk. The alternative would be to perform all deliveries at the secondary and tertiary care centres. However, at present, this is not a practical solution in many isolated areas in Canada.

The guidelines of the Newfoundland prenatal record will identify some of the patients in need of specialized care. It does not identify all the fetuses at risk and it is not effective in identifying the need for nonelective intervention. However, further experience with the guidelines and investigation by family practitioners, obstetricians and neonatologists might enhance the usefulness of the guidelines in optimally matching patients with risk factors to facilities and personnel in both small hospitals and referral centres that will best serve the patients' needs.

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