Management of obstetric complications at a small rural hospital

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To determine if there is a way of identifying obstetric patients in whom complications will develop, the experience of one small hospital was reviewed. It was found that there is no satisfactory method presently available that allows a hospital to select such patients so that they can be referred to a large centre. While the scoring system designed by Goodwin, Dunne and Thomas for assessing antepartum fetal risk is fairly effective in selecting fetuses at risk, its results do not correlate well with the frequency of obstetric complications. Since in a significant proportion of obstetric patients complications develop that require emergency intervention, it is important that hospital staff maintain their ability to do safe cesarean sections and to obtain blood for transfusion quickly. Hospitals in which there are fewer than 100 deliveries per year probably do not have a sufficient caseload to maintain the ability to do safe cesarean sections; it is therefore suggested that they discontinue obstetric practice. At hospitals with a larger caseload elective cesarean sections should be done so that the ability to do emergency procedures can be maintained.

L'expérience acquise dans un petit hôpital a été passée en revue pour déterminer s'il existe un moyen qui permettrait de prévoir les complications en obstétrique. On conclut qu'il n'y a actuellement aucune méthode satisfaisante qu'un hôpital pourrait employer pour opérer la sélection des patientes devant être adressées à un centre plus grand. Bien que le système de cotation mis au point par Goodwin, Dunne et Thomas pour l'évaluation antépartum des risques pour le foetus soit passablement efficace dans le dépistage des foetus à risques élevés, la corrélation entre les résultats de cette cotation et la fréquence des complications obstétricales est insuffisante. Étant donné qu'une proportion non négligeable des complications obstétricales exigent une intervention en urgence, il est important que le personnel hospitalier reste en mesure de pratiquer des césariennes en toute sécurité et d'obtenir sans délai le sang nécessaire aux transfusions. Puisque le recrutement dans les hôpitaux où le nombre d'accouchements annuels est inférieur à 100 ne permet pas, probablement, de maintenir les possibilités d'effectuer des césariennes sans danger, on suggère qu'ils devraient abandonner la pratique obstétricale. Dans les hôpitaux où le recrutement est plus important, il faudrait pratiquer des césariennes électives pour pouvoir conserver les possibilités d'entreprendre des interventions d'urgence.

A difficult problem that a physician practising in a rural area frequently faces is deciding which patients should be referred to a larger centre. As transportation improves and services become more specialized, it is natural for the rural practitioner to restrict the type of work he or she does. While many patients can be more adequately and safely treated where there are specialists and extensive facilities, patients often prefer to be treated in the local hospital to avoid the travel and the long periods away from home. The physician also has to consider the effect of referrals on the local facilities. If too many patients are referred the local hospital loses its capabilities, and the patients who require emergency treatment suffer. The deterioration of services in the small hospital often becomes self-perpetuating.

The role of the small hospital is a subject that generates a lot of controversy, but about which there are very few facts. There is little material in the literature, it is something not learned in medical school, and it is a subject about which the urban specialist is hardly qualified to make judgements. It is therefore necessary that physicians practising in rural areas look carefully at their practices and try to establish guidelines that will result in the best treatment for all of their patients. Such guidelines will have important implications in the training of physicians who are going to serve in the rural parts of Canada.

The problem is probably most acute in obstetrics. With the improvements in obstetric and neonatal care there has come a need for more specialization. The declining birth rate has led to surplus facilities at large hospitals, which are willing and anxious to accept referrals from small centres, and to a caseload at many small hospitals that is insufficient to

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maintain the expertise and facilities needed to handle complications. However, few communities are willing to give up their obstetric services. Patients find it hard to accept that the birth of their children, which should be a physiologic process, cannot be handled near home. The local medical staff would lose an important part of their practice and the hospital would lose one of its most important roles. The presence of an obstetric service is often seen as the difference between a unit's being a "real" hospital and its being just a nursing home.

While Canada is becoming increasingly urbanized there is still a large proportion of the population living in rural areas, and many physicians still practise in small hospitals. The number of small hospitals and the number of deliveries per year in each province are shown in Table I. Hospitals with fewer than 400 deliveries per year are considered small, for it is unlikely that many of them would be able to support an obstetrician or maintain a good neonatal nursery with specialized nurses. Hospitals with fewer than 100 deliveries per year would find it very difficult to handle obstetric complications. The fact that in 1976 there were 584 small hospitals in Canada with more than 65 000 deliveries indicates the size of the problem.

A common policy of the small hospital is to handle only "normal" obstetrics. This assumes that there is a method of screening obstetric patients so that those in whom complications are going to develop can be identified and safely transported to a referral centre. Various scoring systems have been designed to determine antepartum fetal risk.[1-3] The most widely used in Canada is that of Goodwin, Dunne and Thomas.[4] It has been shown that there is a good correlation between the score obtained by this system and fetal outcome.[5,6] However, this system was not designed to identify cases in which operative intervention or treatment of maternal complications will be required. A modification[7] of the Goodwin, Dunne and Thomas system is widely used in Manitoba as a guide for the assignment of obstetric privileges in small hospitals, but no evidence has been published to indicate that the score obtained has any correlation with the frequency of complications of labour and delivery as opposed to fetal complications. Another study using a similar scoring system found that there was no apparent relation between a high score and the type of labour or the need for cesarean section.[8] Analysis of hormones and other chemical methods[9] are not useful in this situation since they are generally not available to the rural physician and are appropriate only for the patient already determined to be at high risk. We have been unable to find any objective criteria to help the rural physician identify obstetric patients in whom complications are going to develop.

Any screening method used should identify virtually all of the cases in which surgical intervention will be required or complications will develop long enough before the emergency arises so that the patient can be transferred. Unless the method is highly selective the hospital staff will be faced with doing interventions they are not prepared to do, or transporting patients after the situation has become critical. The transportation of patients over a considerable distance once fetal distress has become evident or in the face of active hemorrhage is associated with added risk for both fetus and mother.

It is also important that not too many patients be transferred for delivery. If women have to leave their homes and families to await labour in a city some distance away, they will be unhappy. If too many patients are expected to do this, some will rebel and wait until it is too late, so that they will have to be looked after near home.

For guidance in making these decisions, and to help determine the level of care that small hospitals should offer, we reviewed the experience at Baie Verte Peninsula Health Centre. The questions that we have attempted to answer are:

1. Is there a means of identifying with sufficient accuracy obstetric patients in whom complications will develop or operative intervention will be required?

2. In view of the caseload at our centre and the complications we must handle, what level of services should we reasonably attempt to give?

The centre

The Baie Verte Peninsula Health Centre, on the north-east coast of Newfoundland, is the only source of primary care for a population of about 12 000 living in 21 coastal villages. At the well equipped 40-bed hospital, which is staffed by six physicians, there have been about 200

Table I—Number of births (excluding stillbirths) in 1975 at small hospitals in Canada*

Province or territory	Hospitals with 100 or fewer births per year		Hospitals with 101-400 births per year		Total	
	No. of hospitals	No. of births	No. of hospitals	No. of births	No. of hospitals	No. of births
British Columbia	35	1 811	27	5 918	62	7 729
Alberta	67	2 732	32	5 599	99	8 331
Saskatchewan	94	2 924	16	2 867	110	5 791
Manitoba	51	1 812	17	3 142	68	4 954
Ontario	34	2 534	67	14 786	101	17 320
Quebec	18	854	30	7 144	48	7 998
New Brunswick	12	432	15	3 632	27	4 064
Nova Scotia	13	531	16	3 526	29	4 057
Prince Edward Island	3	40	2	210	5	250
Newfoundland	9	552	15	3 109	24	3 661
Yukon and Northwest Territories	6	189	5	1 125	11	1 314
Total	342	14 411	242	51 058	584	65 469

*Source of data: *Canadian Hospital Directory*, vol 24, Finch K (ed), Can Hosp Assoc, Toronto, 1976.

deliveries per year. The nearest centre with specialized facilities is 2 hours away by road. Travel can often be difficult and hazardous during the winter. Patients who were referred to the regional hospital were sent primarily because they needed intensive monitoring or because the newborn was thought likely to need special care. It has been our practice to do most cesarean sections at our hospital.

Methods

We conducted a retrospective survey of all patients who had received prenatal care in our unit and carried the pregnancy beyond 20 weeks during the period Jan. 1, 1975 to Dec. 31, 1976. Those that had been referred elsewhere for delivery were not excluded. The Goodwin, Dunne and Thomas system for assessing antepartum fetal risk had been in use in the unit for some time, although scoring had not been done in all cases. The score was calculated for all cases from data on the patient's record. The score used in the analysis was that applicable at the time of the admission immediately prior to the delivery. All complications, both fetal and maternal, and all instances of operative intervention were tabulated. An attempt was made to correlate the risk scores and the individual risk factors with the occurrence of complications. When there was operative intervention the urgency was assessed. Cesarean sections were classified as emergencies if, at the time it became evident that the patient would need the procedure, it was judged that the 2-hour delay required for transportation would mean added risk for the fetus or the mother. Semiemergency procedures were those that had to be done at odd hours, but for which a 2-hour delay was not considered to be significant, as when labour began in a patient booked for an elective cesarean section or when labour failed to progress during the first stage.

The maternal complications considered, aside from cesarean section, were the need for blood transfusion and the need for manual removal of the placenta. The proportion of patients needing blood transfusions is important in a small hospital, where it is difficult to maintain a good blood banking service. Manual removal of the placenta was considered an important complication because the safe management of these patients requires good anesthesia and blood banking service.

Results

During the 2-year period 386 patients in our practice carried a pregnancy beyond 20 weeks and delivered in either our unit or the referral hospital. Of these, 57 (14.8%) required a cesarean section; 17 were classified as emergency, 22 as semiemergency and 18 as elective procedures. The indications for the emergency cesarean sections are listed in Table II.

The Goodwin, Dunne and Thomas fetal risk score is correlated with the fetal outcome in Table III. The perinatal mortality for pregnancies lasting 28 weeks or more during the 2 years was 2.07% in our practice, compared with 1.67% for Canada and 2.20% for Newfoundland during 1974. There appears to be a reasonably good correlation between the fetal risk score and the frequency of fetal complications. If it had been possible to transfer to another centre the 72 patients with a score of 4 or more, all nine pregnancies resulting in fetal loss would have been managed in the referral centre. There would have remained in the practice a significant number of premature infants and infants with a low Apgar score, so that it would have been necessary to maintain good resuscitation and transport services.

The fetal risk score is correlated with the occurrence of obstetric complications in Table IV. There appears to be some correlation, but it is not as close as between the fetal risk score and the fetal outcome. Almost half of the emergency cesarean sections were done in women with low-risk pregnancies (those with fetal risk scores of 2 or less). The number of patients requiring blood transfusions and the number requiring manual removal of the placenta were greater in the low-risk group than in the high-risk group.

To see if the identification of patients that required emergency intervention could have been improved, the risk factors in the pregnancies resulting in emergency cesarean section were examined. Risk factors, such as premature labour, malpresentation diagnosed during labour and persistent bleeding, that were not manifest before the emergency arose were not considered. The remaining risk factors that appeared more than once among the 17 patients and had a greater frequency in the subgroup than in the total group of 386 obstetric patients are listed in Table V. As expected, many of the pregnancies

Table II—Indications for emergency cesarean section at a small hospital

Complications	No. of deliveries
Third-trimester hemorrhage	
Abruptio placentae	4
Placenta previa	2
Malpresentation diagnosed during labour	
Breech in primipara	3
Shoulder	2
Breech with hydrocephalus	1
Failure of labour to progress in second stage of labour	3
Fetal distress in first stage of labour	2
Total	17

Table III—Correlation of Goodwin, Dunne and Thomas fetal risk score with fetal outcome

Fetal risk score	No. of deliveries	Complications, no. (and %)			
		Stillbirths	Neonatal deaths	Weight < 2500 g	Apgar score < 8
0	37	0	0	0	1 (2.7)
1	110	0	0	1 (0.9)	1 (0.9)
2	110	0	0	2 (1.8)	9 (8.2)
3	57	0	0	3 (5.3)	2 (3.5)
4	42	1 (2.4)	0	3 (7.1)	5 (11.9)
5	18	1 (5.6)	1 (5.6)	1 (5.6)	2 (11.1)
6	6	1 (16.7)	0	1 (16.7)	0
7	2	1 (50.0)	0	0	0
8	2	1 (50.0)	1 (50.0)	1 (50.0)	1 (50.0)
9	2	1 (50.0)	1 (50.0)	1 (50.0)	1 (50.0)
10	0	—	—	—	—
Total	386	6 (1.6)	3 (0.8)	13 (3.4)	22 (5.7)

had more than one risk factor. Only the factors of nulliparity, grand multiparity, previous unsatisfactory outcome of pregnancy and postmaturity had a positive association with the need for an emergency cesarean section. Pregnancies with one or more of these factors constituted 56.5% of the total group of 386, while they included 88.2% of those who needed an emergency cesarean section.

Among the patients who had an elective or a semiemergency cesarean section few problems were encountered. There were no premature infants (birth weight less than 2500 g) and no infants manifested the respiratory distress syndrome. One infant delivered by elective cesarean section and three delivered by semiemergency cesarean section had an Apgar score of less than 8 at 1 minute. There were no significant operative complications.

Discussion

The number of cases in this series was not sufficient to allow detailed statistical analysis, a problem common to almost any study of rural populations. The perinatal mortality was comparable to the national and provincial rates, but no conclusions about the quality of practice can be made from this fact since the number of deaths was so small. The proportion of cesarean sections performed was also similar to that in larger centres. It could be argued that the small centre should have a higher rate since there is less expertise in handling difficult vaginal deliveries and the cesarean section often becomes the safer means of delivery.

Of the cesarean sections almost one third were classified as emergency procedures. These are the cases that create the real problems for a small unit. Unless they can be foreseen, either they must be managed locally or the added risk of transport must be accepted. These cases made up a significant proportion (4.4%) of the deliveries at our unit. It is possible that the number of emergency cesarean sections could have been reduced by more careful prenatal care. Some of the cases of malpresentation and cephalopelvic disproportion could have been diagnosed earlier, possibly by the more liberal use of radiologic examinations or other techniques. The presence of a hydrocephalic infant in a breech position is a debatable indication for cesarean section, but we considered it to be the best method of management. The first hemorrhage in a case of placenta previa is rarely an indication for an emergency cesarean section, but in both of the cases included in our series the hemorrhage was sufficiently severe to preclude transportation and necessitate immediate delivery.

We have been unable to obtain information on the proportion of emergency cesarean sections in other practices. The proportion in our practice may be considered high, but it is presented as our actual experience. Further work would have to be done to determine if a lower proportion could be achieved through better prenatal care.

Our results help to confirm that the Goodwin, Dunne and Thomas fetal risk score is a good forecaster of fetal complications. The difficulty with using this method to determine which patients need to be transferred for specialized care is that many of the factors that result in a high score are not determined until the situation has become critical. Premature labour and third trimester bleeding, for example, are in themselves emergency situations and cannot be used to select patients for transfer. This problem has received attention in the Nova Scotia fetal risk project,[5] one of the objectives of which is to improve the predictive ability of the Goodwin, Dunne and Thomas scoring system.

The Goodwin, Dunne and Thomas scoring system was not designed to identify cases needing obstetric intervention and would not appear to be useful for this. In our series there was no score that would permit adequate selection of the great proportion of those requiring an emergency cesarean section or other intervention. The problem of the scores' not

Table IV—Correlation of fetal risk score with occurrence of obstetric complications

Fetal risk score	No. of deliveries	Complications, no. (and %)		
		Emergency cesarean sections	Blood transfusions	Manual removal of placenta
0	37	0	1 (2.7)	1 (2.7)
1	110	5 (4.5)	3 (2.7)	0
2	110	3 (2.7)	4 (3.6)	5 (4.5)
3	57	1 (1.8)	0	0
4	42	3 (7.1)	2 (4.8)	1 (2.4)
5	18	2 (11.1)	0	0
6	6	1 (16.7)	1 (16.7)	0
7	2	0	0	0
8	2	1 (50.0)	1 (50.0)	0
9	2	1 (50.0)	2 (100.0)	0
10	0	—	—	—
Total	386	17 (4.4)	14 (3.6)	7 (1.8)

Table V—Relation of risk factors* to need for emergency cesarean section†

Risk factor	Total group, no.	Patients needing emergency cesarean section, no. (and % of total group)
Previous history	44	5 (11.4)
Para 6 or more	17	2 (11.8)
Stillbirth	10	2 (20.0)
Premature birth	15	2 (13.3)
Neonatal death	6	2 (33.3)
Nulliparity	120	8 (6.7)
Postmaturity	78	5 (6.4)
42 weeks	63	3 (4.8)
43 weeks plus	15	2 (13.3)
Total	218	15 (6.9)

*Those that appeared more than once among the 17 patients needing emergency cesarean section and had a greater frequency in the subgroup than in the total group of 386 patients (4.4%).
†Since many of the pregnancies had more than one risk factor the columns of numbers do not always add up to the subtotals.

being determined until after the situation has become critical also applies in this situation.

When the individual risk factors on the list of Goodwin, Dunne and Thomas were examined it was found that only a few factors had an association with the need for emergency cesarean section. By choosing all the patients with these factors one can select 88.2% of those requiring emergency cesarean section. While the numbers in this study were too small to determine if this selection method was valid, it can be seen that such a method would require the referral of a large proportion (56.5%) of the practice and, even so, our centre would have been left with two emergency cesarean sections. The correlation with nulliparity and postmaturity of 42 weeks was not strong. If only the patients for whose pregnancies the other factors applied had been selected for transfer, we would have transferred only 69 (17.9%) of our patients but would have been left with 11 (64.7%) of the emergency cesarean sections. Neither of these selection criteria would appear to be useful in practice.

Until a method is available that will select patients in whom complications are going to develop it is not reasonable for a hospital to adopt the policy of doing only "normal" obstetrics. Any obstetric unit should be prepared to handle the complications that arise in its practice. In practical terms this means that any obstetric unit should retain the ability to do cesarean sections, give blood transfusions and give anesthetics.

If hospital staff are to maintain their ability to do emergency cesarean sections they must do a certain minimum number. The number of emergency cesarean sections done in a small hospital is usually not sufficient to maintain the team's ability. It makes sense that any hospital prepared to do emergency cesarean sections should also do elective cesarean sections, and our experience suggests that this practice is not associated with any significant added risk to the mother or infant. The extra experience makes the team better prepared to safely handle difficult emergency cases.

A hospital with 100 deliveries per year does about one cesarean section per month if it does all of its own. We consider this to be the minimum that can maintain a hospital staff's ability to do safe cesarean sections. Hospitals with smaller caseloads than this should therefore not be doing any cesarean sections and, since they are unable to handle the complications, should not be practising obstetrics at all. This guideline is arbitrary and has to be interpreted in the light of local circumstances. For example, some very isolated hospitals must continue doing obstetrics even though they do not have the patient load. Other hospitals with easy access to larger centres may elect to do "normal" obstetrics only and accept the added risk associated with transferring all patients in whom complications develop.

Any hospital that is going to continue obstetric practice should also have ready access to blood, since there is no way to predict which patients will need a transfusion. Except for hospitals very close to a larger centre with a blood bank this means maintaining a list of prescreened and readily available blood donors. It also means that the hospital must maintain the staff's ability to do safe crossmatching.

Since the mother's uterus makes the best transport incubator, it is reasonable that the small hospital should make every effort to transfer the patient with a high-risk pregnancy before the situation becomes critical. However, if the decision is made to handle any obstetrics in the unit, it is appropriate to manage patients needing an elective cesarean section or other intervention when the fetus is not considered to be at high risk.

If these guidelines become accepted in the small hospitals across Canada, many will discontinue obstetric practice and others will have to develop the ability to do cesarean sections. This will have important implications in the training of physicians and other hospital personnel who are to work in the rural parts of Canada. At present it is difficult for a physician to get sufficient training in obstetrics so that he or she will be competent to handle complications without having to take complete specialty training.

Conclusions

At present there is no adequate means of identifying obstetric patients who are liable to require emergency operative intervention. The Goodwin, Dunne and Thomas scoring system for assessing antepartum fetal risk is useful for helping to select the fetus at risk, but it does not help identify patients in whom obstetric complications will develop.

In the absence of valid selection criteria it is not practical for the small hospital to plan to do only "normal" obstetrics. Any hospital practising obstetrics should be prepared to manage complications. It is suggested that a unit with fewer than 100 deliveries per year cannot maintain the ability to manage complications and hence should discontinue all obstetric practice. Similarly, at small hospitals that continue obstetric practice elective cesarean sections should be done so that the staff can maintain their ability to do emergency cesarean sections. The primary indication for referral of an obstetric patient to a larger centre should be the need of the fetus for specialized attention either before or after delivery.

References

1. HOBEL JC: Recognition of the high-risk pregnant woman, in *The Management of High-Risk Pregnancies*, SPELLACY WN (ed), Univ Park, Baltimore, 1976, pp 1-28
2. LESINSKI J: High-risk pregnancy: unresolved problems of screening management, and prognosis. *Obstet Gynecol* 46: 599, 1975
3. EFFER SB: Biochemical and biophysical indices of fetal risk. *Clin Perinatol* 1: 161, 1974
4. GOODWIN JW, DUNNE JT, THOMAS BW: Antepartum identification of the fetus at risk. *Can Med Assoc J* 101: 458, 1969
5. *Nova Scotia Fetal-Risk Project, Annual Progress Report 1974, Coll. Fam. Phys. Project 602-7-147,* College of Family Physicians of Canada, Willowdale, Ont
6. YEH S-Y, FORSYTHE A, LOWENSHOH RI, et al: A study of the relationship between Goodwin's high-risk score and fetal outcome. *Am J Obstet Gynecol* 127: 50, 1977
7. COOPLAND AT, PEDDLE LJ, BASKETT TF, et al: A simplified antepartum high-risk pregnancy scoring form: statistical analysis of 5459 cases. *Can Med Assoc J* 116: 999, 1977
8. HEINS HC: Identification of the high-risk obstetrical patient: the use of an objective scoring method. *J SC Med Assoc* 72: 213, 1976
9. FARQUHAR JW: Amniotic, urinary and serum hormones in fetal diagnosis. *Can Med Assoc J* 105: 174, 1971